

# SOUTHERN POWER AND INDUSTRY

Ad Index, page 150

MAY, 1950

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*Annual*  
**Maintenance**  
*Issue*



# Rolling Again in 36 Hours

## THANKS TO ALLIS-CHALMERS CERTIFIED SERVICE!

A vital press of the *Detroit News* went out of commission when a 5 hp inching motor, overspeeded at 20,000 rpm, flew apart. Stecker Electric, an A-C Certified Service Shop, was called. Broken end bells had to be welded and machined to fit. The stator was rewound. Rotor windings were replaced. After completely testing the motor, it was back in service in just 36 hours!

IN DETROIT, and over 75 other cities covering all major industrial areas, you will find Allis-Chalmers Certified Service Shops. Make them your source for fast, reliable electrical repair service! Independently owned and operated,

these shops have been selected for their experience, highly skilled workmen, complete servicing facilities, and sound business reputation.

To save time, trouble and money on emergency or routine maintenance service call on your nearest Allis-Chalmers Certified Service Shop.

**GOOD SOURCE FOR NEW MOTORS, TOO**  
Remember — your local Allis-Chalmers Certified Service Shop or Authorized Dealer offers the same fast, dependable delivery on new motors—plus matching control from one to 200 hp. For service or new equipment, count on Allis-Chalmers.

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MILWAUKEE, WIS.

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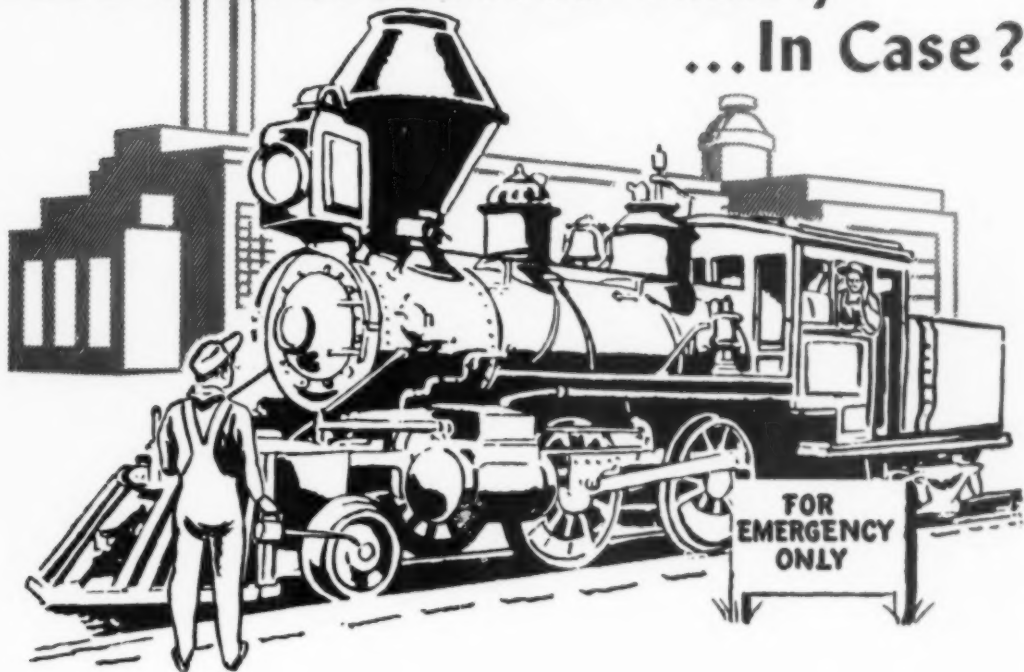
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Volume 68

Number 5



# Got a Locomotive Handy ...In Case?



**E**VERY so often a steam locomotive makes news by going to the rescue of a plant where the steam system gave out at a critical time.

This is one answer to continued steam production pending repairs... and undoubtedly an expensive one. Simplest—and most economical—is to use the Nalco System and eliminate the chances of boiler down time due to faulty water treatment.

Nalco chemicals and services aim at *water treatment results* from raw water intake to condensate hot well... And the thousands of plants now using the Nalco System testify to the accuracy of this aim during the past twenty-six years. Whether your plant is large or small; your water problems scale, corrosion, carry-over—or just plain high cost—unless you have a locomotive handy for emergencies, better check with Nalco today. No obligation... and an excellent chance for permanent water treatment security.

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...and  
fuel costs  
are less  
when you  
lubricate  
with  
Texaco  
Ursa Oils

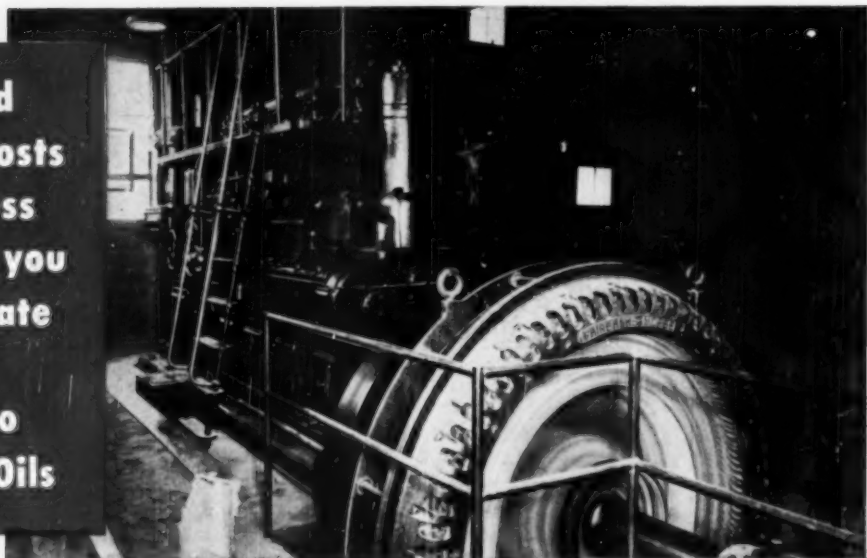


Photo courtesy Fairbanks, Morse & Co.

ANY Diesel lubricated with *Texaco Ursa Oil* is bound to run cleaner because *Texaco Ursa Oils* have high resistance to oxidation . . . and are designed to keep harmful carbon, sludge and varnish from forming. So rings stay free, valves work the way they should, ports stay open . . . assuring better compression and combustion.

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There is a complete line of *Texaco Ursa Oils*. They are approved by leading Diesel manufacturers, and are easily America's favorite Diesel lubricants — as shown by the fact that *more stationary Diesel b.p. in the U. S. is lubricated with Texaco Ursa Oils than with any other brand.*

Get a greater return from your Diesel operating dollar. A *Texaco Lubrication Engineer* will gladly help you. Just call the nearest of the more than 2,000 *Texaco Wholesale Distributing Plants* in the 48 States, or write:

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FOR ALL DIESEL ENGINES

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

# SOUTHERN POWER AND INDUSTRY

Vol. 28  
No. 5

MAY  
1950



Annual  
MAINTENANCE  
ISSUE

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Editorial and Executive Offices: SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E., ATLANTA 5, GEORGIA

# WHAT ARE YOU PAYING for Condensate? \$ \$ \$ \$

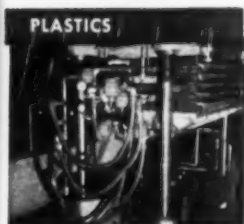
If your steam heated equipment is not supplied with hot, dry steam kept in intimate contact with the heated surface and free from air, you are paying for fuel that is being thrown away every hour.

Worse yet, you are paying double in lost production and rejects, if your equipment is not properly trapped and vented.



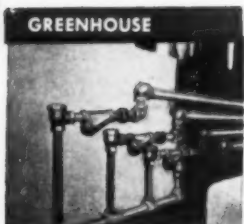
## \$ LOST TIME

Heating up time was reduced from 3 hours to 1 by using Sarco No. 9 Thermostatic Traps on enamel ovens in a large auto body plant. This trap has large air venting capacity. Removes condensate at 10°F below steam temperature.



## \$ REJECTED GOODS

With seven platens on this large plastics press, the weakest link (one cold section) made rejects frequent and without notice. Now seven Sarco Bucket Traps kick out the condensate and provide trouble-free production. This trap is ideal for releasing condensate as quickly as it forms—a must on plastics presses.

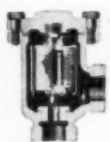


## \$ LOST FUEL

Most manufacturers don't know how much fuel they are losing due to inefficient trapping. In greenhouses, where fuel is a large part of the cost, monthly fuel bills tell the story fast. This greenhouse saved 30% of the fuel and 60% of the make up water by using Sarco Thermostatic traps on every line and every coil.

## FOUR TYPES OF SARCO STEAM TRAPS TO CHOOSE FROM

Sarco makes all accepted types and can fit the trap to the job. Ask for trap selection chart No. 1600.



THERMOSTATIC



FLOAT-  
THERMOSTATIC



BUCKET



LIQUID  
EXPANSION

**SARCO**  
SAVES STEAM

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# Facts and Trends

## FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

May, 1950

300,000 SQ FT OF "CONTROLLED CONDITIONED" maintenance, repair, and storage facilities are nearing completion at Humble Oil & Refining Company's Baytown, Texas refinery. Completed portion of the vast project is featured in this issue of SP&I. Unique building design, including unusual thermal and acoustical treatment in walls and ceiling, gives Humble personnel an important maintenance advantage which is already affording cost reductions through improved and efficient working conditions.

A MAGNETIC-FLUID CLUTCH, although still in the laboratory stage, has been announced by G.E. Consisting of two metal cylinders, each able to rotate independently on the same axis, the clutch transmits rotary power from its source to its load. Cylinders are separated by a magnetic mixture of oil and finely-divided iron powder. When the unit is energized, fluid instantly solidifies, making a rigid connection between the two cylinders, so that motion is transmitted through a solid connection. Power can be applied to the load and removed from it easily by the clutch operator. Degree of rigidity of the magnetic fluid can be controlled by regulating the current. Thus, the clutch can be allowed to slip if necessary.

ALUMINUM JACKETS IN LIEU OF PAINT FOR FURNACE STACKS is the trend at the Cities Service Refining Corporation at Lake Charles, Louisiana. Installation described in this issue of SP&I was made in May, 1949 and has already rendered service triple that of the average paint coating.

THE FIRST ANNUAL HOUSTON INDUSTRIAL EXPOSITION will be held May 10 through May 14 at the Coliseum in Houston, Texas. Of prime interest to Southern and Southwestern plant engineering personnel will be over 200 diversified exhibits of national and regional manufacturers covering materials handling, power transmission, electrical and mechanical maintenance, and plant services. Clinics will be held on welding techniques, materials handling, and plant safety.

TRI-FUEL ENGINES are being installed in the \$2,900,000 M & A Electric Cooperative generating plant at Poplar Bluff, Missouri. First unit, now installed, and known as the LSV-16 Cooper-Bessemer, develops over 3400 hp. It is the first engine of its kind in the world to operate on diesel fuel oil alone, on natural gas alone, or on fuel oil and gas mixed in any proportion.

SCREWED VS WELDED PIPING is always a live subject and comparative factual data is seldom presented. An extensive expansion program, including new power plant, steam distribution system, and bottling plant, was recently completed by the Frank Fehr Brewing Company of Louisville, Ky. Their Chief Engineer, Mr. Charles A Schott, had an excellent opportunity to check the comparative costs of fabrication for welded and screwed and flanged construction. This cost data and specific factors to be considered by the plant engineer in deciding the type of construction to employ will be featured in an early issue of SP&I.

THE NUMBER ONE CAUSE OF MAINTENANCE HEADACHES on most electrical equipment is the lack of design and operating information. Most plant master mechanics are unfamiliar with electronic systems, but many manufacturers (judged from the type of jargon they produce under the name of wiring diagrams and instruction booklets) seem to feel that all maintenance men are junior Edisons who have been raised on Thyratrons and Amplidynes.

Both plant engineers and manufacturers can do much to remedy the situation. When new equipment is installed, the installation engineer should go over the layout and wiring diagram, with the electrician, explaining the operation and purpose of each part. The explanation needs to be in PLAIN LANGUAGE. For instance, rectifiers can be explained in terms of check valves and rheostats, or in similar terms--terms a mechanical man can understand.



**PAINT ROLLERS AND PRESSURE FED PAINT BRUSHES** are rapidly cutting that 12 per cent of a painter's time spent merely in dipping the brush into the paint. On this page in the March issue of SP&I, we mentioned models of the Rubberst Company in which the flow of paint is under the complete control of the painter. One model has a paint reservoir in the handle; in another, the paint is stored under air pressure in a tank, from which it is fed to the roller. **ADVANTAGES:** economies on unobstructed surfaces and reduction in paint splattering. **LIMITATIONS:** brush still required for corners and trim, although wheel-shaped rollers may solve this problem.

In one model of **PRESSURE FED BRUSHES** by Hanlon & Goodman, brush is fed through hose connected to handle, which leads from any standard pressure equipment. Paint flows through hose line, through a channel in brush handle, and out to bristles of a special "insert" brush which is detachable for changing. Valve in brush handle controls paint flow. Standard pressure equipment and fittings connect the brush with any standard spraying equipment in the usual manner.

**140,000 TONS OF FLY ASH** will be used in producing the 3,000,000 cu yds of concrete for the Hungry Horse Dam, fourth largest dam in the world, according to **BITUMINOUS COAL RESEARCH**. Fly ash has the ability of combining with lime at ordinary temperatures in the presence of water to form a cement. It is this ability that permits its use as a partial replacement for portland cement in concrete.

**NEW QUALITY CONTROL INDICATOR** by General Electric keeps an automatic, continuous check on reject rates in manufacturing operations, and makes possible the location and remedy of abnormal production difficulties as quickly as they occur. In practice the indicator, signaled by a device such as an electric eye or a switch tripped by passing objects, counts the number of articles produced. An inspector pushes a button every time he rejects a unit and this causes a change of reading on the indicating meter. The needle on the meter moves from the green half of the scale to the red half when reject level exceeds a pre-determined rate, and thus indicates that corrective action is needed.

**WANTED:** commercial uses for a costly, little-known metal which becomes liquid on a very warm day (melting point 86 F) but does not boil away until heated to about 3600 F. It is **GALLIUM**, produced by The Eagle-Picher Co. as a by-product of lead and zinc extraction in the tri-state area of Missouri, Kansas, and Oklahoma. The current price quoted on this silvery unusual material is \$1,300 a pound.

**A WHITE METAL ALLOY**, which begins to bond at the exceptionally low temperature of 354 F, is highly adaptable for sealing cracks and building up defects on **CAST IRON**. Called **EutecRod 15**, it is particularly suitable where high temperatures may cause distortion or cracking, such as on very thin sections, delicate castings, or machine tool ways.

**ECONOMIES IN INSTALLATION AND MAINTENANCE** are expected to offset any differential in material cost on the 1.8 mile underground all-welded **ALUMINUM GAS LINE** running from the main trunk line of the Alabama-Tennessee Natural Gas Company to the Listerhill, Alabama plant of Reynolds Metals Company. The 8 5/8-in. od, 63ST-6 aluminum alloy pipe with 1/4-in. walls comes in 40-ft lengths and is joined by straight butt welds.

**NEW STEEL PICKLING CONTROL SYSTEM** for the Weirton Steel Company, Weirton, West Virginia incorporates a G.E. "magnetic loop control" to govern sag of strip steel as it passes through four successive baths of hot sulphuric acid. Continuous strips of steel, driven by rollers, are immersed in four tile-lined tanks of boiling acid. New control regulates tension of steel strip as it moves through tanks, preventing metal from scraping bottom thus damaging surface finish. Control is activated by an electric coil imbedded in bottom of the second tank. A magnetic field, set up within the sulphuric acid by the coil, is influenced by the steel strip as it passes through the tank.

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Write the editors for additional information on any of the above items.  
**SOUTHERN POWER & INDUSTRY**      806 Peachtree St., N.E.      Atlanta 5, Ga.

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# ***NOW!* uniform combustion efficiency from high peaks to low loads with the**

# **ENCO TYPE K**

## **OIL-GAS BURNER UNIT**

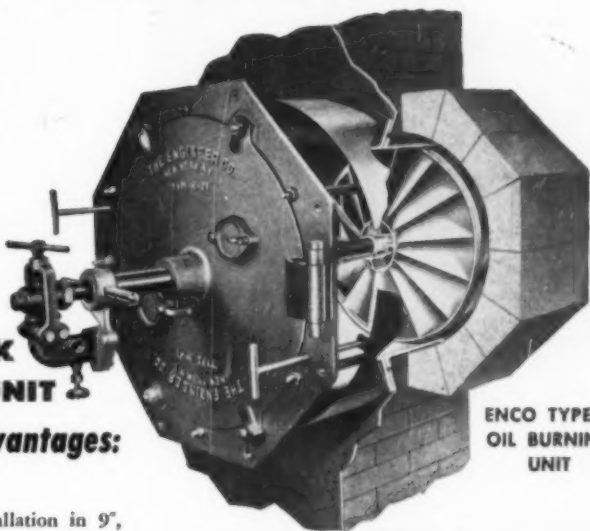
**HERE'S THE LATEST** advance in burner units, designed to provide completely uniform combustion over the entire load range. The new ENCO Type K Oil-Gas Burner Unit is especially effective where steam demands swing sharply over short periods.

### **THE ENCO TYPE K OIL-GAS BURNER UNIT**

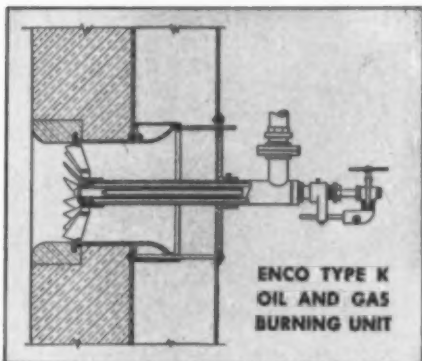
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This new Type K Unit is the result of pioneering research, aimed to help you achieve more efficient, more economical boiler operation. Write today for further information, or see your local Enco Representative.



**ENCO TYPE K  
OIL BURNING  
UNIT**



**ENCO TYPE K  
OIL AND GAS  
BURNING UNIT**

80-479

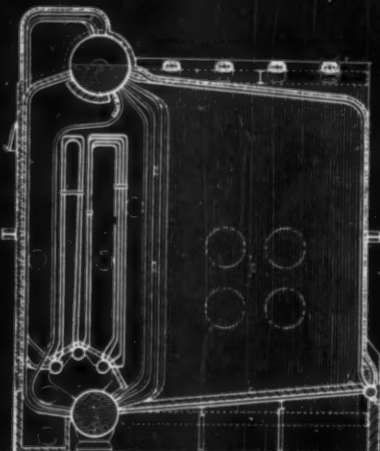
## **THE ENGINEER COMPANY**

**75 WEST STREET, NEW YORK 6, N. Y.**

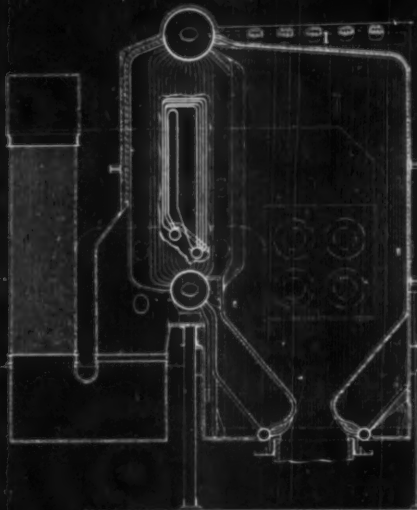
## B&W INTEGRAL-FURNACE BOILER TYPE FH

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B & W Engineering  
for Economy*

# bringing NEW *Economies* *in Steam* to all industries



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Manufacturing, process, and service industries, along with many power companies all over the U. S. A. are finding the ideal answer to their new steam requirements in the B&W Integral-Furnace Boiler, Type FH. Installations range in steam capacity up to 350,000 lb. per hr. per unit, employing a wide diversity of fuels and firing methods, pressures to 1050 psi, and temperatures to 910 F.

An important advance in steam engineering, this B&W unit brings together, in a modern, standardized design, all the best features of the original and highly successful Integral-Furnace Boiler, introduced by B&W 17 years ago, plus many additional improvements . . . each one time-tested and performance-proved.

Immediate and widespread acceptance—over 39 million pounds per hr. of steam capacity installed or ordered—is evidence that the Type FH Boiler satisfies all modern requirements for dependability, efficiency, accessibility, adaptability, and economy of installation and operation. It will pay you, as it has so many others, to consult B&W engineers about this boiler when planning steam plant expansion or modernization.

### COST SAVING FEATURES

#### OF B&W INTEGRAL-FURNACE BOILER, TYPE FH

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- Fuel and Firing Flexibility

##### HIGHLY DEPENDABLE, because of:

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- Less Manual Cleaning

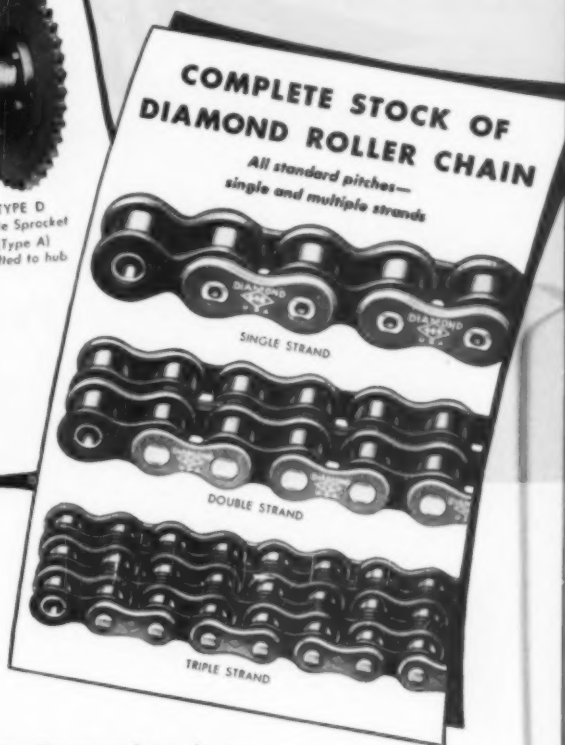
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# BURN ECONOMICAL HEAVY OIL

## with the highly efficient IRON FIREMAN Industrial Oil Burner

Now you can use economical heavy oils (Nos. 5 and 6) with the Iron Fireman Industrial Oil Burner and get a steady, even flame, regardless of varying oil temperature or viscosity. This steady flame starts more smoothly and it *stays* steady, even at very low burning rates.

### New Principle of Oil Control

Iron Fireman's exclusive Oil Volumeter employs a new principle of oil control which eliminates the inefficient combustion and many troubles that go with conventional controls. Oil flow control with the Oil Volumeter is positive and precise because the oil feed-rate is

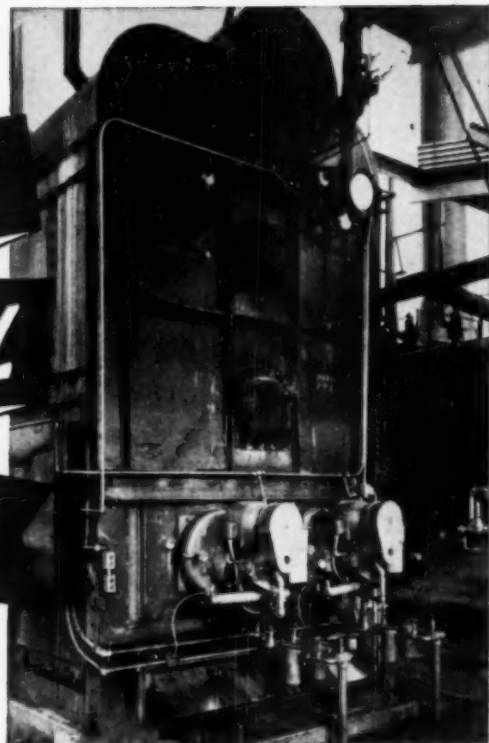


Capacities 2 to 165 gals. per hour. Fires boilers up to 350 h.p. per burner. Positive volume control insures steady flame regardless of oil temperature or viscosity.

regulated by *volume*, instead of using complex mechanisms (as some burners do) to change the size of the opening through which oil flows.

The result of the Oil Volumeter's exact control is steady, non-pulsating combustion, enabling the Iron Fireman Industrial Oil Burner to make an enviable record of fuel and labor savings throughout the United States and Canada.

Write to find out how an Iron Fireman Industrial Oil Burner can reduce your fuel and labor costs. Iron Fireman Manufacturing Co., 3245 W. 106th Street, Cleveland 11, Ohio. Other plants in Portland, Oregon, and Toronto, Canada.



Two Iron Fireman oil burners firing Erie City VL 350 h.p. boiler at 160 p.s.i., 200% of rating. Deodorizes by-product gases in combustion chamber of boiler, in addition to generating steam. Fuel is high acid petroleum, by-product of asphalt production; consistency of fuel varies from No. 1 to No. 6.



# IRON FIREMAN

## INDUSTRIAL OIL BURNER



2

## New Steam Generating Units for

**NORTH  
CAROLINA**

SOME of the finest steam generating plants in the country are to be found in American engineering colleges where every facility is available for studying designs, efficiency, dependability, and general performance. Springfield has an outstanding record in supplying steam generators for schools, colleges, and universities.

The design shown here is for two 60,000 lb. units for North Carolina State College of Agriculture and Engineering which is a part of the University of North Carolina. The operating pressure is 425 psig at super-

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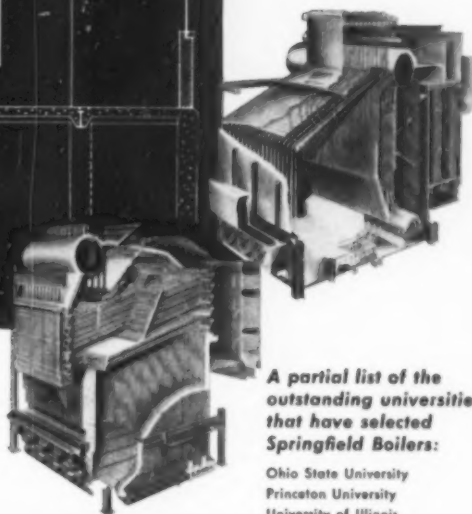
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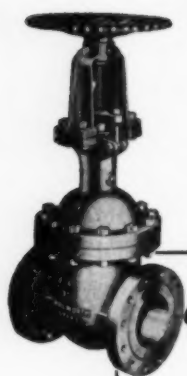
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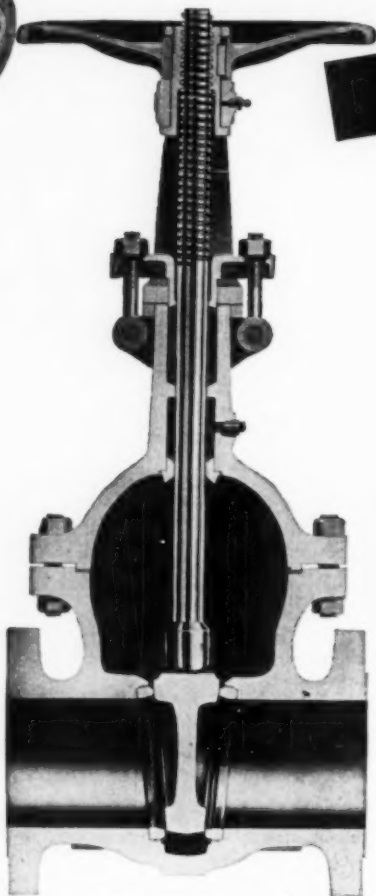
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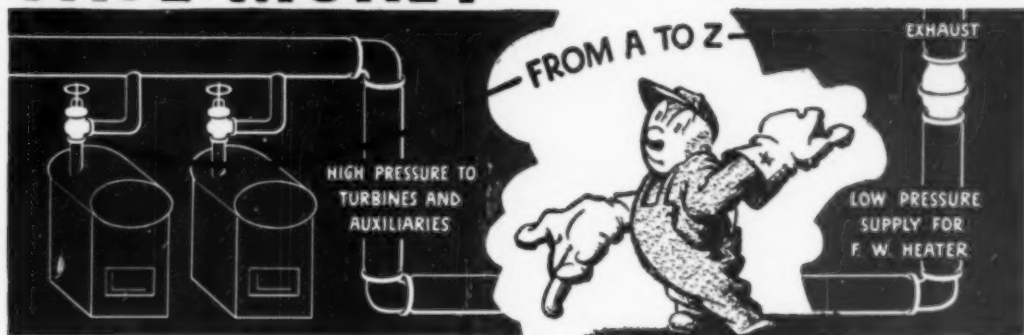
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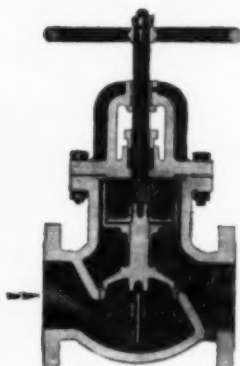
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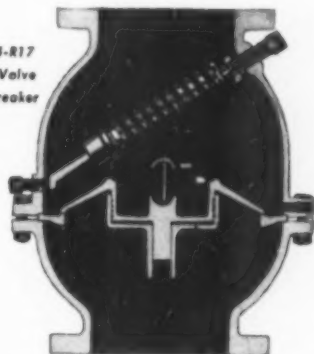
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**870 ELECTRIC CABLES**—Bulletin SP-1087—Describes Oshlin-Oshpore cables, possessing many advantages from the standpoint of installation, electrical operation, and design. Complete details as to dimensions, engineering data and application.—THE OSHLIN COMPANY.

**876 REMEDIATION FURNES**—Booklet 206-A—The advantages of "Powder-packed" renewable fumes for dependable and continued service.—TRICO FURN MFG. CO.

## MISCELLANEOUS

**1029 GAS-DIESEL ENGINES**—Bulletin L-61—Describes with complete specifications and applications the type L6 gas-diesel engine, built as 6, 7 and 8 cylinder stationary units developing 255 to 1500 hp.—COOPER-BESSEMER CORP.

**1031 UNIT HEATERS**—Bulletin 21553—Describes employee heating comfort as achieved by counterflow heaters which blanket from 6000 to 20,000 sq ft with warm air at working level, oil or gas fired, readily converted, immediate delivery, easy installation, ventilation in summer.—DRAYO CORP.

**1035 UNIT HEATERS**—Bulletin No. 150-4 describes unit heaters which give quick warm-up to meet sudden changes in weather conditions—horizontal and down blow, non-ferrous heating elements, full protection against expansion strains and stresses.—FEDDERB-QUIGAN CORP.

**1040 DUST RECOVERY**—Booklet, 23 pages—Outlines the theories and basic principles of centrifugal dust recovery, and the application of multi-stage units, with their advantages of adaptability, space saving, high efficiency and low maintenance.—WESTERN REFRIGERATION CORP.

**1044 INDUSTRIAL INSULATION**—Descriptive Catalog A-81 contains data on application, coverage, ranges and advantages of industrial insulating materials, blocks, blankets, foam, fill materials, pipe coverings, protective coverings and condensation compound and fireproofing cement—for temperatures from sub-zero to 2500 degrees F.—EAGLE FIBER CO.

**1046 STEEL FABRICATING**—Bulletin describes plate, structural and tank fabrication, as furnished by various plants in Alabama and Mississippi—for industrial, utility and marine plants.—INGALLS INDUSTRIES.

Continued on page 146

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371	411	420	432	434	446	465	479	497	506	530	532	527	533	548	579	606
604	628	680	661	670	678	688	709	717	730	738	772	784	802	837	846	870
876	1029	1031	1035	1040	1044	1046	810	811	812	813	814	815	816	817	818	819
820	821	822	823	824	825	826	827	828	829							

Also send further information on following New Equipment (see pages 144-148)

P P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13 P14 P15 P16 P17

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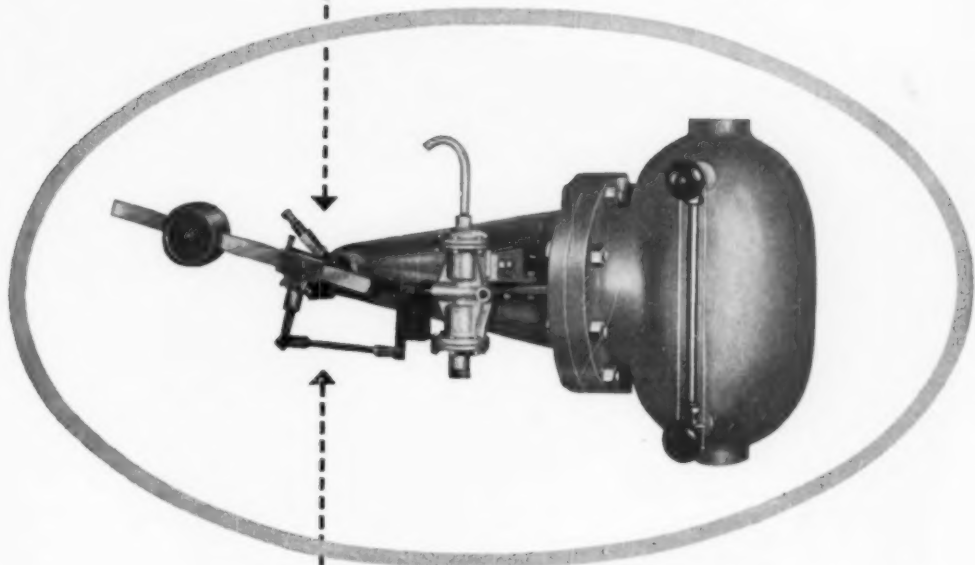
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**...THE HONEYWELL FLOAT CAGE**

User reports show up to ten years of accurate, dependable service . . . on surge tanks, feedwater heaters, evaporators, deaerating tanks, stills and other process equipment! This eliminates one troublesome maintenance problem . . . and, at the same time, assures the continuity of service that leads to greater processing efficiency.

Honeywell Float Cages are supplied either with direct connection for mechanical operation, or with on-off or throttling type pilot valve for pneumatic operation. In addition, the Honeywell line includes internal float type level controllers for use where vessel design and conditions permit.

Honeywell Float Cages are available in Bronze, Cast Iron, or Cast Steel . . . with Bronze, Stainless Steel or Special Alloy trim. Float sizes—6", 8" and 10".

Call in your local Honeywell engineer for detailed information about these float cages and such other Honeywell Control Specialties as Hi-Lift Hand Control Valves, Non-Lubricated Cylindrical Plug Valves, Transfer Valves, and the Honeywell Space-Saving Bypass.

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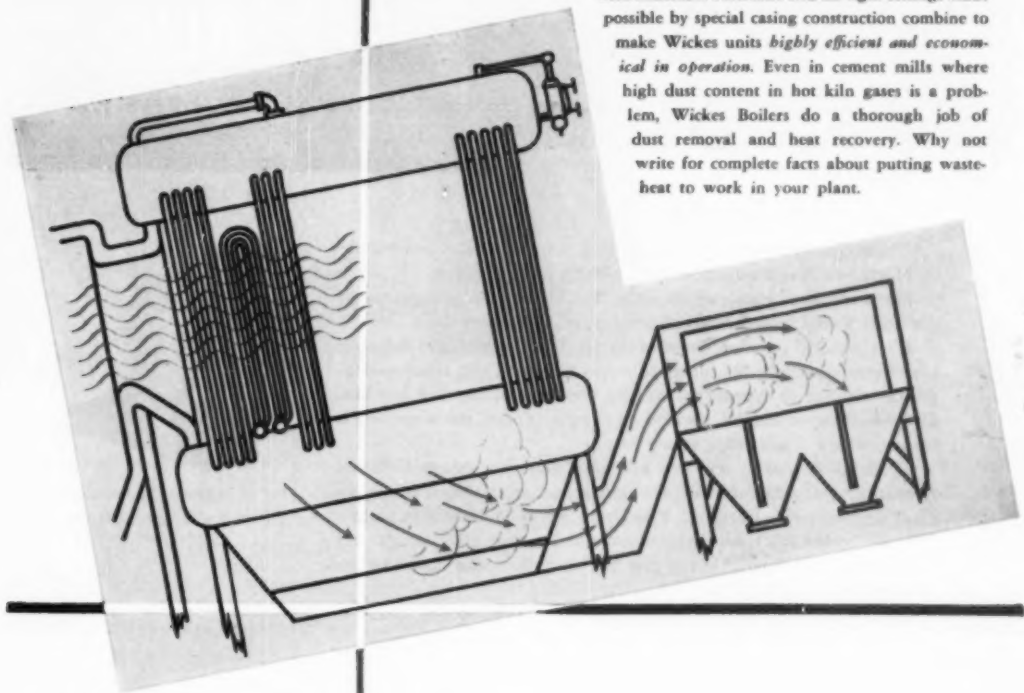


## WICKES WASTE-HEAT BOILERS

**CONVERT WASTE-HEAT  
into  
PROFITABLE POWER**

Waste heat, once discharged from manufacturing equipment as a loss, has been made to realize a high economic return through the installation of Wickes Waste-Heat Boilers. In actual cases, the reduction in the costs of manufactured products has paid for the waste-heat installation within 2-3 years time, and in some industries, heat recovery is sufficient to produce all steam and power required.

Wickes Boilers are correctly designed and built to effect maximum heat recovery from all types of waste gases. High gas velocity, long gas travel with minimum resistance and air-tight settings made possible by special casing construction combine to make Wickes units highly efficient and economical in operation. Even in cement mills where high dust content in hot kiln gases is a problem, Wickes Boilers do a thorough job of dust removal and heat recovery. Why not write for complete facts about putting waste-heat to work in your plant.



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For nearly three years, this Republic Belt has been in constant use at the Coon Valley Sand & Gravel Company in Des Moines, Iowa.

It's a standard type belt fitted to the job by an experienced Republic Distributor, the Globe Machinery & Supply Company, and, although continually exposed to extreme and varying weather conditions, it has handled hundreds of tons of abrasive aggregates. Today, the same belt is hard at work . . . still going strong.

If, like thousands of conveyor belt users, you want custom-built features which give you results like this, without incurring special fabricating charges, check with Republic. Your local Republic Distributor carries in stock hundreds of job-designed industrial rubber goods items, like Record Maker Belting. He can give you immediate and expert service in every field of application.

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## ELECTRIC PRECIPITATOR

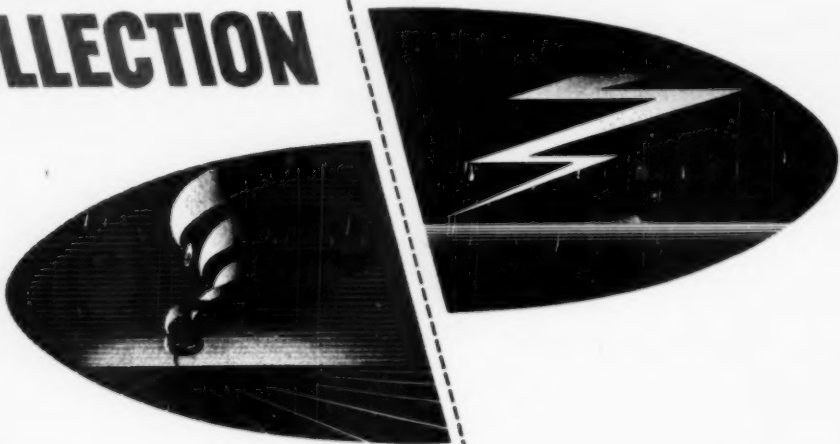
This announcement of the availability of a made-in-America "SF" Precipitator is NEWS of broad significance. With a Precipitator, also, Buell is in a position to provide any efficiency desired in the collection and recovery of fine and ultra-fine dusts.

The Buell "SF" Electric Precipitator is made under license from Svenska Fläktfabriken, subsidiary of ASEA (Swedish General Electric Company). Through 18 years of engineering experience and more than 150 installations in 11 countries, the broadest range of operating conditions have been met. The "SF" Precipitator now takes up equivalent first line service in the Americas:

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  - in fly ash and nuisance dusts collection for general air pollution abatement.
- Sizes and types of equipment are standardized to meet all needs.

The Buell Sales Engineering Staff invites opportunity to discuss specific problems. Write, wire or telephone.

## World experience in both techniques of **DUST COLLECTION**



## CYCLONE

Scientific dust collection and the doing away with air pollution was just coming into its own in 1935, when Buell introduced to America the high-efficiency van Tongeren designs of AERODYNE.

The Buell van Tongeren Cyclone pioneered in lifting centrifugal dust separation onto a new high plane. How solidly its patented van Tongeren Shave-off contributed to reaching otherwise unobtainable efficiencies is evidenced in the multi-industry use of this Buell System—and 15 year records of multiple re-orders. For many, many conditions the Buell van Tongeren Cyclone is bound to be first preference, with fractional efficiencies, costs, operating simplicity and long term reliability all taken into account. Catalog on request.



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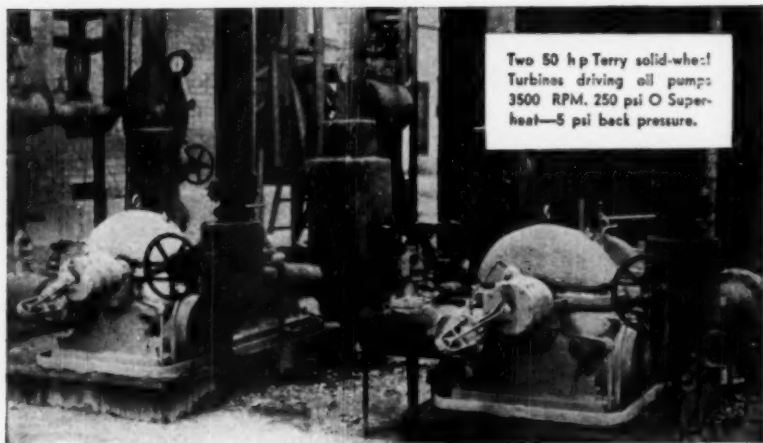
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T-1174

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8. **Valve Stem Lubricator**—Ball check type—lubricants for various conditions.

**VALVES**—Sizes: 1/2" thru 8". For line pressures up to 250 lbs. per square inch. Rugged construction to withstand piping strains.

#### VARIETY OF VALVE BODIES

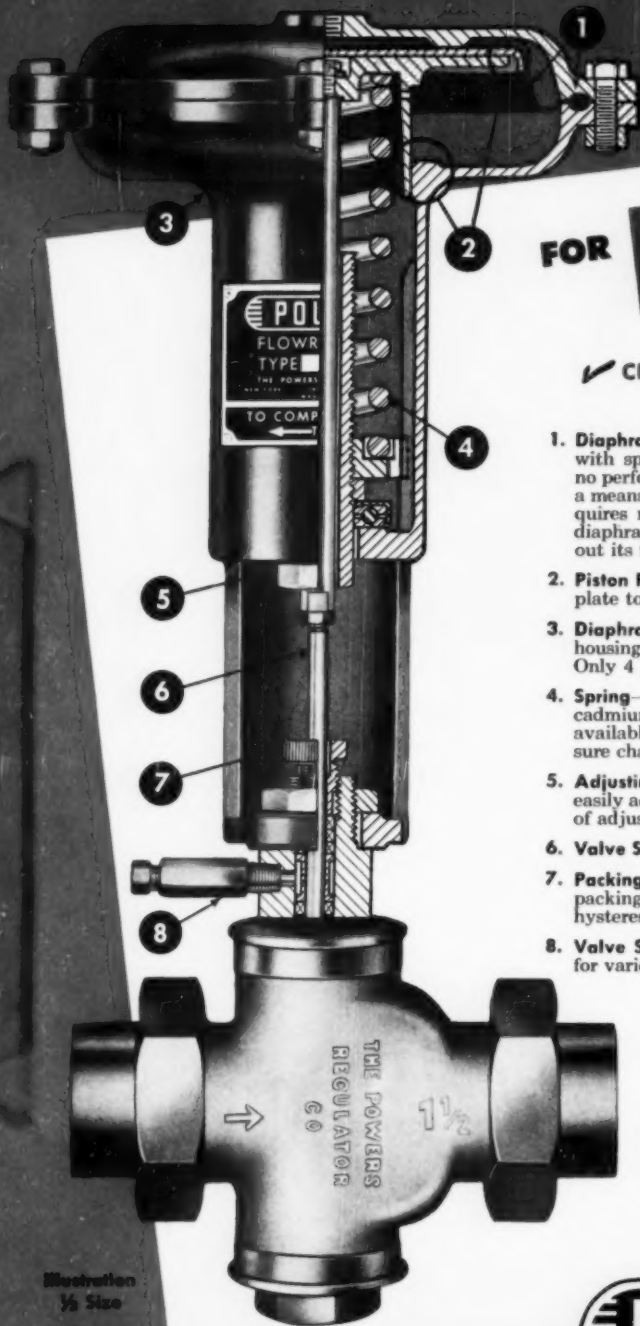
Single seat or double seat, bronze and stainless steel trim. Double unions and flanged ends. Available normally open (direct acting) or normally closed (reverse acting) and 3-way mixing type valves.

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**2. Spring**—Cadmium plated. Calibrated to give full valve travel with 5 lbs. air pressure change.

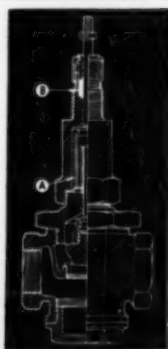
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**6. VALVES—Sizes:** 1/4" thru 2"; bronze bodies with screwed ends, maximum body pressure 125 lbs., rugged construction to withstand piping strains. **TRIM**—Composition disc with brass integral seat and self-aligning disc holder. Available normally open (direct acting) or normally closed (reverse acting), and three way.

range to give proper sequence operation where required.

**4. Stem**—Polished stainless steel.

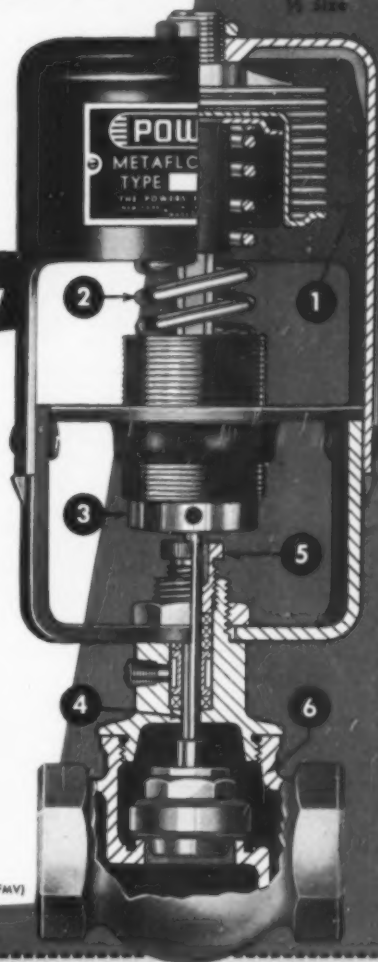
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Prevent leakage of dangerous inflammable or harmful liquids or gases . . . prevent waste and provide vacuum protection. Are suitable for use with Freon, oil, gasoline, non-corrosive gases, hot or cold water and low pressure steam. Have many uses in chemical plants, oil refineries, power plants, submarines and surface vessels.

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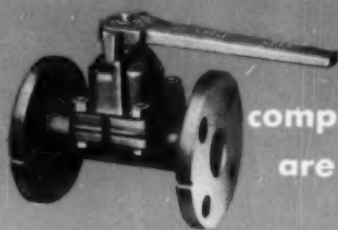
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Invented by a mine engineer to stop air leaks. A rubber diaphragm seating on metal gives positive closure, even when scale is lodged on the weir. At the same time, working parts are isolated from the air lines so that no packing glands are needed, no stem leaks are possible. That was the idea behind the Grinnell-Saunders Diaphragm Valve. As one engineer said, "When about a third of your air compressors are just pumping air out through leaks and this diaphragm valve eliminates the leaks, cutting out one-third of your air costs, why you've really got something."



Diaphragm gives leak-tight closure against grit, scale, solid matter. The resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum. You can't keep scale out of compressed air lines but tests prove that Grinnell-Saunders Diaphragm Valves give perfect closure when scale up to 1 6" diameter is trapped in 1" valves and up to 3/4" solids in larger valves.

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Friction loss reduced by streamlined flow in both directions. Diaphragm lifts high to give unobstructed passage. Friction coefficient remains practically constant throughout range of valve sizes.



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Self-financing through compressed air savings. This table from "Compressed Air Data Book" shows how fast you can pay for Grinnell-Saunders Diaphragm Valves out of the compressed air savings, and, perhaps, avoid the purchase of larger compressors.

Size of opening inches	Cu. ft. wasted per month at 100 lbs. pressure based on nozzle co-efficient of .65	Cost of waste per month based on 6 cents per 1000 cu. ft.
3/8	6,671,890	\$400.31
1/4	2,920,840	175.25
1/8	740,310	44.41
1/16	182,272	10.94
1/32	45,508	2.73

Diaphragms, body and lining material to meet all conditions. Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum (other materials on special order). Linings of lead, glass, natural rubber or neoprene. Diaphragm materials, natural rubber or synthetics. Write for the Grinnell-Saunders Diaphragm Valve Catalog.



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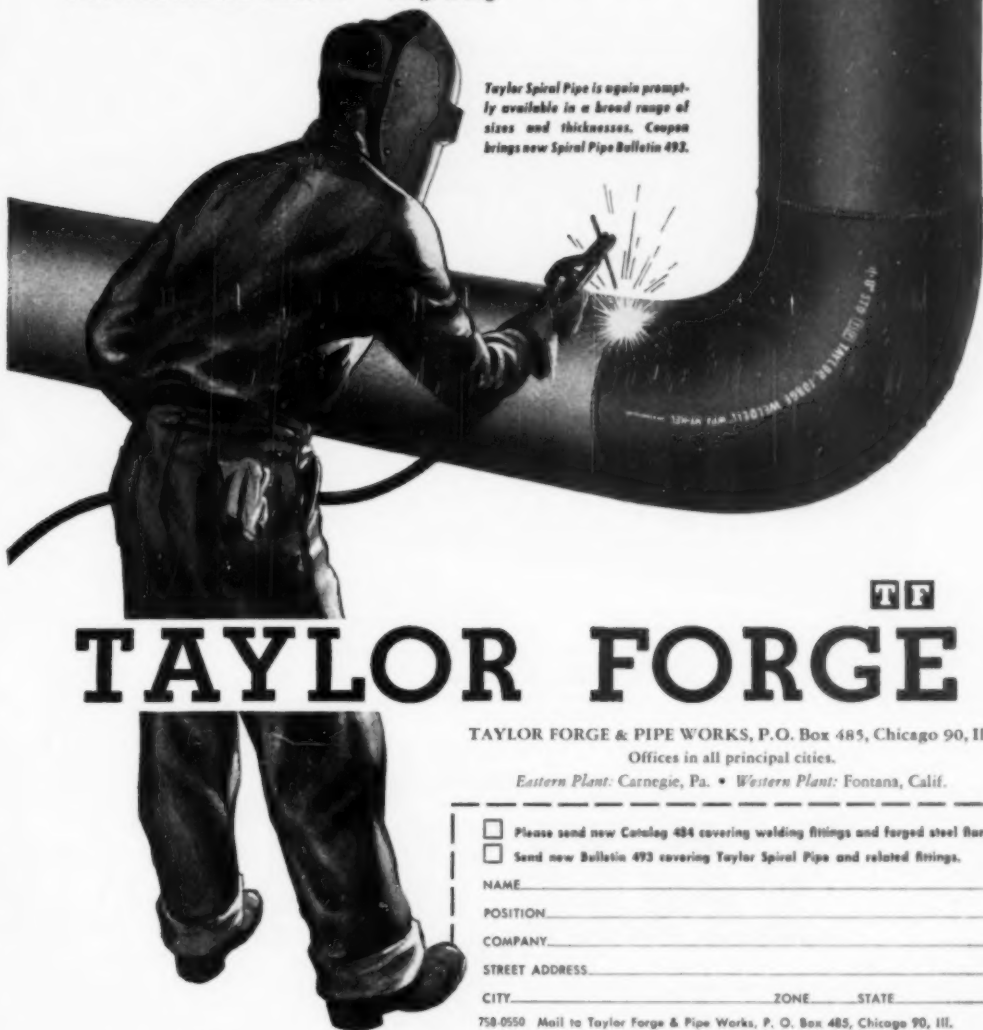
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You will find the answer because the WeldELL line incorporates job-speeding, cost-cutting features that are combined in no other welding fitting.

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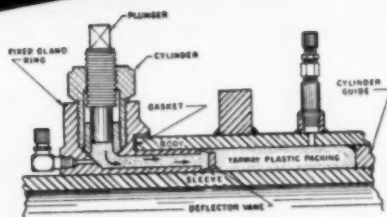
# GUN-PAKT EXPANSION JOINTS

COST LESS  
to maintain

require

NO SHUTDOWNS  
for servicing

Close-up of cross-section  
showing detail of Gun-  
Pakt feature.



# YARWAY

Maintenance costs are less because there's less maintenance.

In a nutshell, that's why more and more utilities, institutions and industrial plants distributing steam are turning to Yarway Gun-Pakt Expansion Joints.

Servicing Gun-Pakt Joints never interrupts heating or production. They are serviced under full steam pressure, without shutdowns.

To repack a Gun-Pakt Joint you simply insert a plug of plastic packing, turn a wrench, and the job's done. Special Alemite fittings provide for proper lubrication.

Users report that Gun-Pakt Joints cost little to

maintain. One who has kept accurate records says "65 cents per year per joint." Others claim even less.

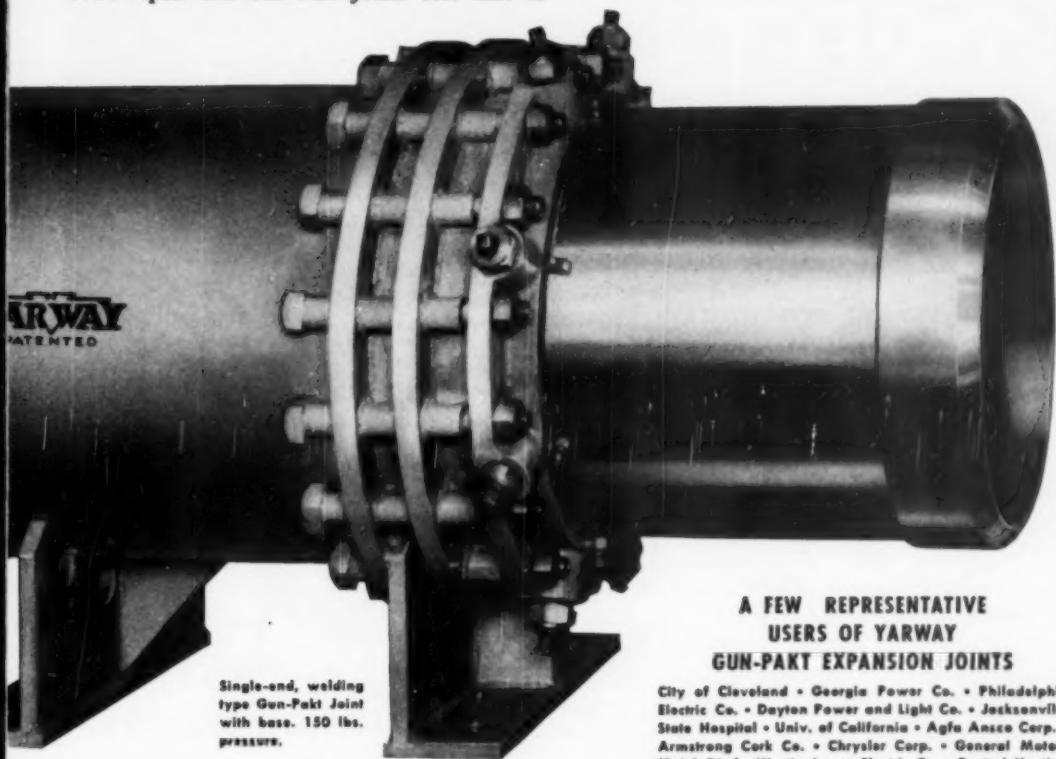
Available with single or double ends, welding or flanged types, in sizes from 2" to 30", with traverses from 4" to 24", and for pressures to 400 psi.

For the full Gun-Pakt story, as well as information on other Yarway slip-type joints, write for Yarway Bulletin EJ-1912.

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Single-end, welding type Gun-Pakt Joint with base. 150 lbs. pressure.

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NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

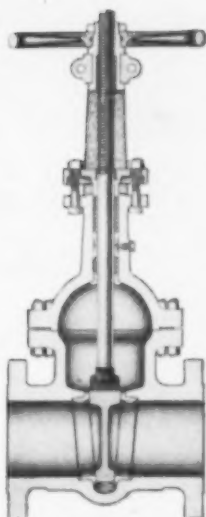
# For completeness of selection You can't beat the CRANE line

## STEEL VALVES FOR SEVERE STEAM SERVICES

Crane Cast Steel Wedge Gate Valves find wide application wherever exceptionally rugged and durable steel valves are required. Body and bonnet have heavy metal sections and ample reinforcements at points under greatest stress. Straight-through ports assure minimum turbulence, erosion, and resistance to flow.

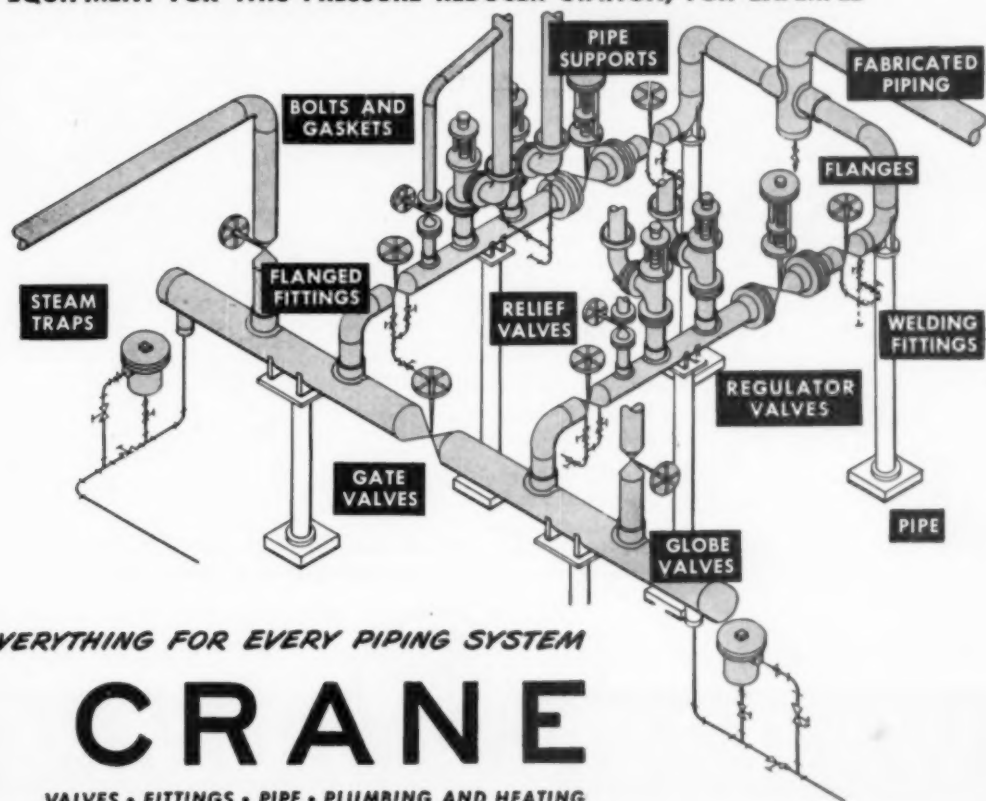
Solid wedge disc with close fitting disc guides maintains accurate seating on shoulder-type screwed-in body seat rings. "T-head" disc-stem connection prevents side strain on stem. Available in pressure classes from 150 to 1500 pounds with a variety of trim materials especially suited for recommended services. Screwed, flanged, or welding ends. See your new No. 49 Crane Catalog, p. 227.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.  
*Branches and Wholesalers Serving ALL Industrial Areas*



No. 33AR, 300-Pound Steel Gate for steam up to 850° F.; for water, oil, air or gas up to 500° F. Exelloy to Nickel Alloy seating. Sizes: 1½ to 24 in.

## ONE ORDER TO CRANE COVERS ALL PIPING EQUIPMENT FOR THIS PRESSURE REDUCER STATION, FOR EXAMPLE



EVERYTHING FOR EVERY PIPING SYSTEM

# CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

SOUTHERN POWER & INDUSTRY for MAY, 1950



WARREN

It's new . . . inside and out

# Cradle Mounted COMPACUNIT



? Do you want to handle corrosive materials that might injure the motor on a close-coupled pump?

? Do you want to use a standard or special motor or turbine?

? Do you want to use a V-Belt drive that will permit a wide range of speeds?

. . . then a Warren Cradle Mounted Compacunit could be the answer. This versatile, efficient and sturdy pump is built to "stand the gaff" . . . and the price lower than you might expect for a quality product of this kind.

.....  
Sizes: 1", 1½", 2", 3"

Capacities: 5 to 450 G. P. M.

Heads: 15 to 500 feet

Materials: Standard, All Iron, All Bronze, or special to meet your requirements

.....

Why not check this pump against your next pumping job, if within the indicated operating conditions? Ask for bulletin #242

P-21

WARREN STEAM PUMP COMPANY, INC.

WARREN, MASSACHUSETTS

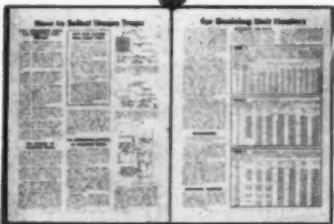
# WARREN PUMPS

## "You can engineer any trapping job with this book"

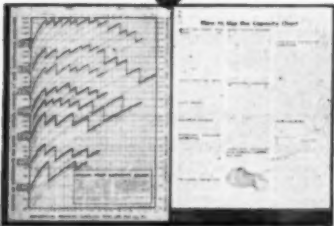
YOU CAN'T GO WRONG



Physical data and prices on all sizes and types of Armstrong steam traps.



How to calculate condensate loads and select traps for all classes of equipment.



Actual hot condensate capacity chart for every Armstrong trap, recommended safety factors and specific recommendations for many types of equipment.



THERE is no guess work about steam traps or steam trap selection when you have the 36-page Armstrong Steam Trap Book to work with. You don't waste money on traps that are too big for the job. You don't get inefficient drainage with traps that are too small.

This book explains the design, operation and advantages of Armstrong steam traps, specifies materials used, gives complete dimensional data, includes list prices, actual capacities under working conditions. There are 10 pages of tabular and technical data explaining how to calculate condensate loads and select the correct trap for the job, complete instructions on installation and maintenance. The Steam Trap Book also describes Armstrong traps for draining moisture from compressed air systems, Armstrong steam humidifiers for adding moisture to dry air and Armstrong non-condensable gas purgers for removing air from refrigeration systems.

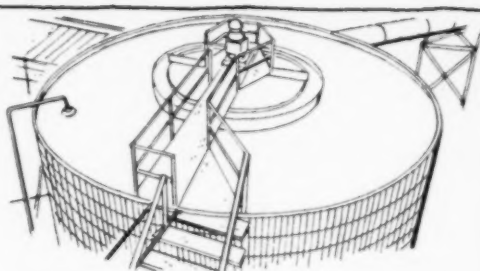
Anyone is welcome to a copy of this useful guide to good trapping practice. Send for yours today.

**ARMSTRONG MACHINE WORKS**  
806 Maple St., Three Rivers, Mich.

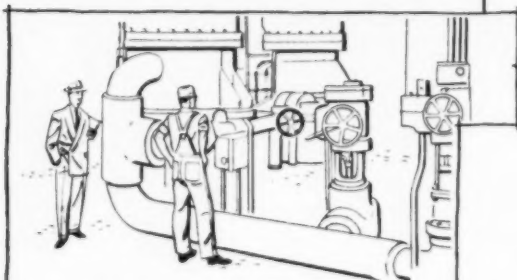
# ARMSTRONG STEAM TRAPS

# YOU GET Complete Recommendations IN HALL BOILER WATER CONDITIONING

When Hall engineers have studied your plant, they recommend procedures which cover not only treatment of boiler water, but also all points of the water and steam cycle which affect the maintenance of desired conditions.



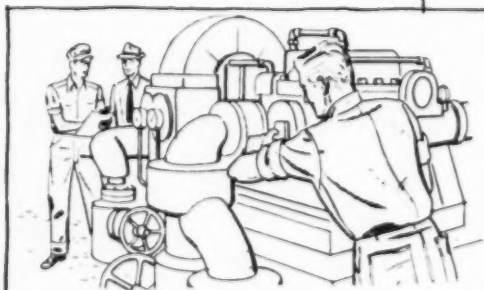
1. Where softening, clarifying or other pre-treatment of raw water is advisable, Hall recommends types of equipment, advises as to results which can be expected with various types of equipment, and shows how to use new or existing equipment to best advantage.



2. Hall recommendations include procedures for the prevention of deposition in pre-boiler equipment, such as feed water heaters, valves, regulators, etc.



3. Water conditions which must be maintained within the boiler are prescribed; testing procedures for checking these conditions are set up; and detailed instructions for maintaining these conditions are given.



4. Steam-using equipment, condensing equipment and condensate return lines may present difficulties, and procedures for preventing these difficulties are part of Hall recommendations.

Hall Laboratories believes that its work can be summed up in a single phrase—to do whatever is necessary to help you keep equipment operating effectively. The best evidence of the value of Hall Service in accomplishing this is the hundreds of plants, large and small, who use Hall Service year after year. Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

## HALL LABORATORIES, INC.

(A Subsidiary of Hagan Corporation)

CONSULTANTS ON  
INDUSTRIAL WATER TREATMENT  
HALL SYSTEM OF BOILER WATER CONDITIONING  
INDUSTRIAL WASTE RECOVERY AND DISPOSAL

# For Peak Production use **LINK-BELT** **SILENT CHAIN DRIVES**

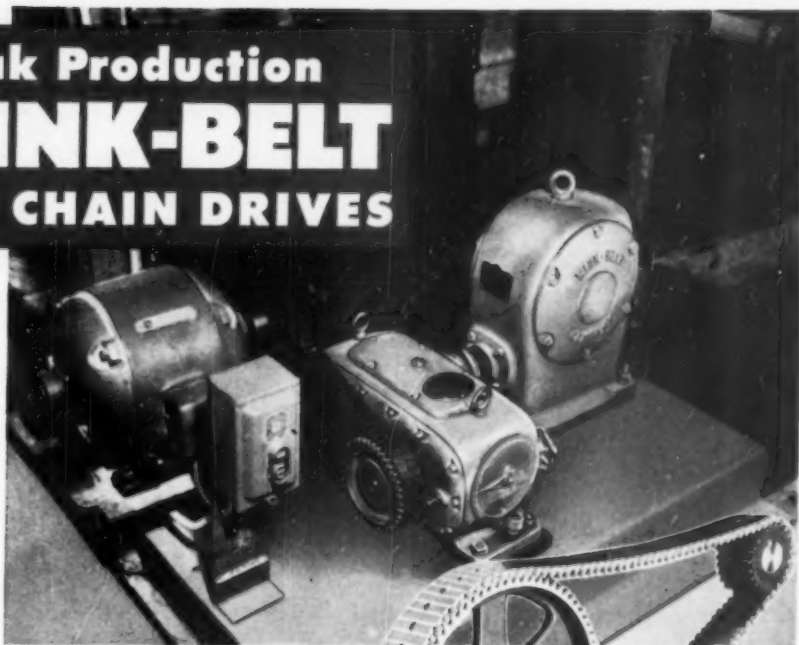
**Easy to  
Select...**

**Easy to Install...  
Immediate Delivery!**

Full output at rated capacity demands power transmission without slippage—such as Link-Belt Silverstreak silent chain drives have always provided. Every r.p.m. is transmitted to the driven machine. Losses due to slippage are eliminated—output is increased. Yet Link-Belt Silverstreak silent chain possesses sufficient flexibility to absorb shock. Even on short centers it runs slack with minimum wear. Moisture, temperature, age or periods of idleness have no effect on these all-steel, precision-built drives, immediately available from stock in ½ to 50 h.p. sizes. Stock Drive book No. 2125-A speeds and simplifies the selection of chains and sprockets to provide the exact drive required for any application in this horsepower range. Send for a copy, at once.

**LINK-BELT**  
*Silverstreak*  
**SILENT CHAIN DRIVES**

SOUTHERN POWER & INDUSTRY for MAY, 1950



## New Features of LINK-BELT

### Pre-selected Stock Silent Chain Drives

#### 1 TAPER-LOCK BUSHINGS

Easy on—easy off—no re boring necessary.

#### 2 PINIONS-HARDENED TEETH

All-steel, with hardened teeth. Finished bores and keyways for N. E. M. A. motor shaft sizes.

#### 3 INTERCHANGEABILITY

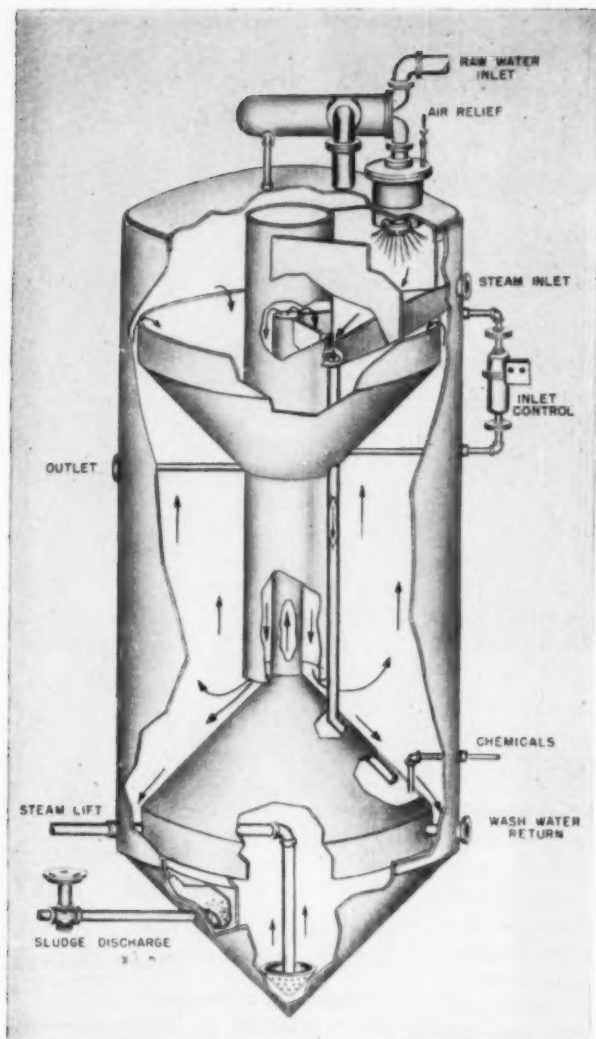
Link-Belt stock silent chain and Link-Belt stock silent chain sprockets are interchangeable with silent chain sprockets and silent chains cut to same tooth form.

#### 4 EASY SELECTION

Easy-to-use selection tables cover ½ to 50 h.p. stock drives, tailored for normal operating conditions.

### LINK-BELT COMPANY

Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.



# New HOT PROCESS WATER TREATMENT



**Deaerates and Softens  
Simultaneously!**

**Q**OR the first time, INFILCO has combined within a single, compact unit, features the power plant operator has long wanted! The new Deaerating Hot Process ACCELATOR® features a *steam lift* which produces internal slurry recirculation without mechanical devices. The same steam lift efficiently deaerates the water undergoing treatment, thereby eliminating separate deaerating mechanisms. Silica is reduced to a new low, because the Hot Process ACCELATOR provides for prolonged magnesium in the slurry, which is later reprecipitated. This brings a saving in chemicals.

A storage compartment is provided in the upper part of the Deaerating Hot Process ACCELATOR for softened and deaerated water, to handle momentary peak demands. This new and better treatment process provides . . . 1. Self-contained deaeration, 2. Controlled slurry recirculation, 3. Maximum silica removal by the redissolving of magnesium, 4. Reprecipitation for chemical economy, 5. An effluent low in turbidity, alkalinity and hardness. Investigate the new Deaerating Hot Process ACCELATOR. Write for complete information today!

**FREE LABORATORY SERVICE . . . SEND FOR THIS WATER CONDITIONING ANALYSIS SHEET!**

Make sure your water meets the exacting specifications you require. Send for our Water Analysis Sheet, then fill in and return it with a sample. You will receive our laboratory analysis and report promptly. A valuable INFILCO CHEMICAL CALCULATOR slide rule sent FREE to all who return our analysis sheet properly completed. No cost or obligation is involved for this laboratory service.



## INFILCO INC.

GENERAL OFFICES: 325 WEST 25th PLACE • CHICAGO 18, ILLINOIS  
SALES OFFICES IN TWENTY SIX PRINCIPAL CITIES

**WORLD'S LEADING MANUFACTURERS OF WATER CONDITIONING AND WASTE TREATING EQUIPMENT**

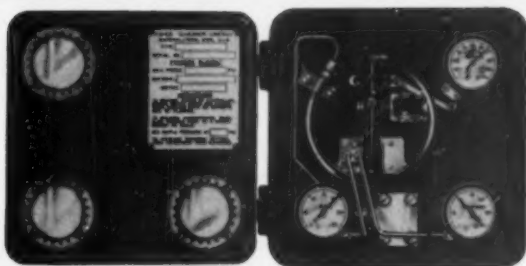






**Your Favorite Dependable  
WIZARD...in a new gas-tight  
weather-proof case for flush  
or surface panel mounting**

Type 4100U remote  
mounting Wizard  
with cover open.



# **WIZARD PILOT**

**SERIES 4100U**

Universal case adapts Wizard to flush or surface  
panel mounting and also to valve yoke mounting.

Available with either bellows or Bourdon tube  
measuring element, for pressures from inches W.  
C. to 10,000 PSI.

Simple knob adjustment for controlled pressure  
setting, indicated on calibrated dial.

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MARSHALLTOWN, IOWA**

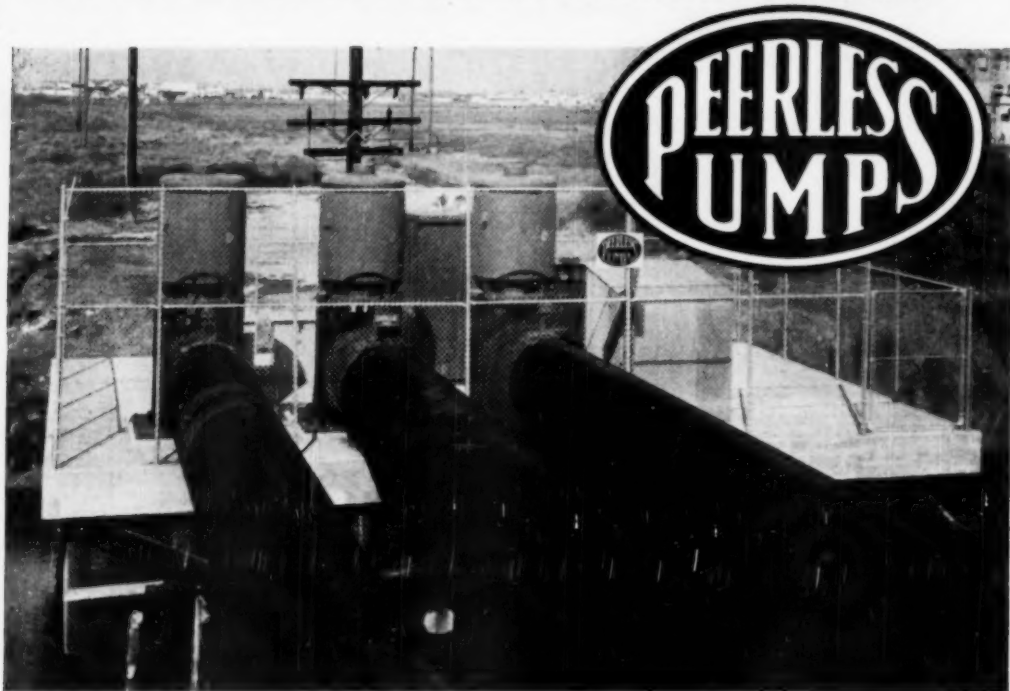


Side view Type  
4100U for flush  
mounting.



Side view  
Type 4100U  
for surface  
mounting.

# PEERLESS IN THE WORLD OF MOVING AND CONTROLLING WATER IN LARGE VOLUMES



## PEERLESS HYDRO-FOIL PUMPS OFFER CAPACITIES RANGING UP TO 220,000 G.P.M. AGAINST LOW AND MEDIUM HEADS FROM 2 TO 60 FEET

### MIXED FLOW AND PROPELLER TYPES—

The best way to move large quantities of water against low or moderate heads is to use Peerless Hydro-Foil Pumps. They're available in two types: propeller type and mixed flow type. Advanced principles of hydro-dynamics applied to the design of these versatile pumps insures lower overall maintenance outlay and reduced pumping costs, in all applications.

### SINGLE AND MULTI-STAGE MIXED

**FLOW PUMPS**—Peerless mixed flow pumps are made in single or multi-stage units to give flexibility in the selection of each pumping unit. These pumps complement the propeller type and embody advantageous characteristics of both

axial-flow and centrifugal pumps. Designed for sump applications with minimum submergence, maximum heads, minimum installation space. Also available in close-coupled types.

**ALL TYPES OF DRIVES**—Any type of drive may be used with Peerless Hydro-Foil Pumps. These include: electric motor, right angle gear drive, V-belt and flat belt or a combination of drives, if required.

**REQUEST 24-PAGE BULLETIN**—For complete design, construction and application data including suggested station arrangements of these Peerless Hydro-Foil Pumps for economical, large-volume water pumping, request Bulletin B-148-1 now.

### A FEW OF THE SERVICES AND APPLICATIONS OF THESE MULTI-PURPOSE PUMPS

- DRAINAGE
- FLOOD CONTROL
- CANAL DIVERSION
- DE-WATERING
- INDUSTRIAL AND PROCESSING APPLICATIONS
- CONDENSER COOLING
- IRRIGATION
- STORM WATER REMOVAL
- SEWAGE AND EFFLUENT REMOVAL



## PEERLESS PUMP DIVISION FOOD MACHINERY AND CHEMICAL CORPORATION

Factories: Los Angeles, California, and Indianapolis, Indiana

Offices: New York, Atlanta, Fresno, Los Angeles, Chicago, St. Louis, Phoenix; Dallas, Plainview and Lubbock, Texas.

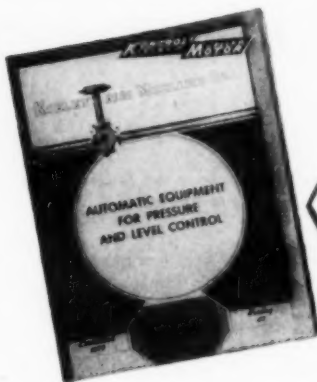
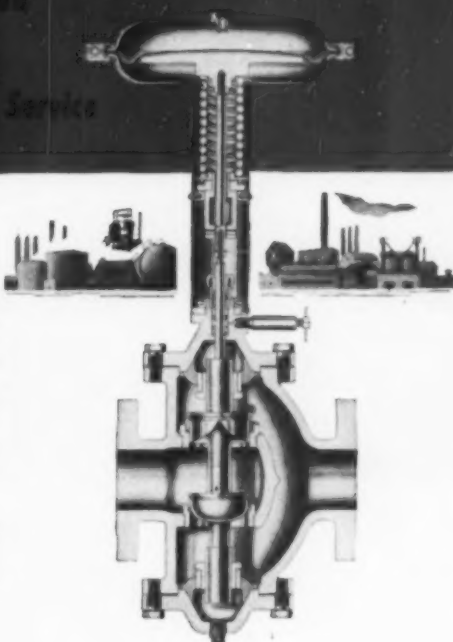
*The Age of Instrumentation Demanded  
More Accurate Automatic Controls  
For Steam, Gas, Air, Oil and Liquid Service*

**and Kieley & Mueller Engineers Responded with  
Designs as Modern as They are Practical!**

This KONTROL MOTOR Pressure Regulator develops the high sensitivity needed for closer regulation. Extra-long, heat-treated springs, having low stress factors are used together with specially designed diaphragms molded to provide extra contact area. This combination assures uniform operating power throughout the stroke of the valves.

The housing is radical in its effective simplicity. The boltless diaphragm casing is sealed with semi-circular steel clamp rings. Time for disassembly and reassembly to inspect or replace diaphragm is thus reduced to a matter of seconds. Casing and yoke are steel for maximum strength and rigidity. Motors are furnished for DIRECT or REVERSE action without deviation in size or accuracy.

These design advances are typical of the fresh, unfettered thinking Kieley & Mueller urged its engineers to employ in redesigning the entire line of automatic controls to keep pace with the demands of process industries for improved regulator performance under increasingly severe conditions.



**Contents — Kieley & Mueller Catalog 47**

Kontrol Motor Diaphragm Valves — Saunders Patent Diaphragm Valves — Direct and Reverse Acting Diaphragm Motor Top Works — Accessories — 28 pages.

Pilot or Direct Operated Liquid Level Controls — Float Valves — Balanced Lever Valves — Ball Float Drainers — 30 pages.

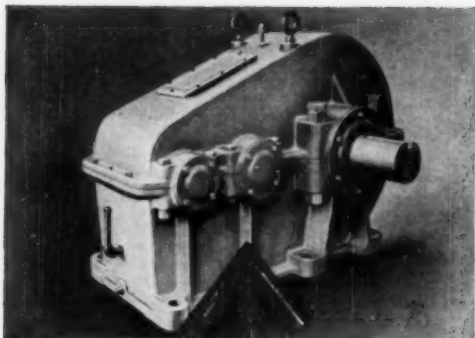
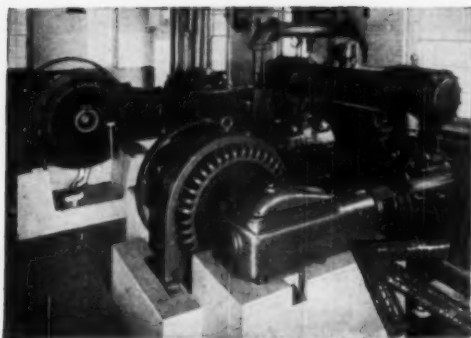
Strainers — 4 pages.

Pressure Reducing Valves — Auxiliary Pilot Regulators — Pump Governors — 36 pages.

Steam Equipment — Back Pressure Valves — Atmospheric or Diaphragm Relief Valves — Stop Check Valves — Exhaust Heads — Grease Extractors — 16 pages.

**The Kieley & Mueller line includes:**





## For the best lubrication use **SINCLAIR RUBILENE**

Over many years engineers in power plants throughout the country have accepted Sinclair's Rubilene as the finest available lubricant for power house equipment.

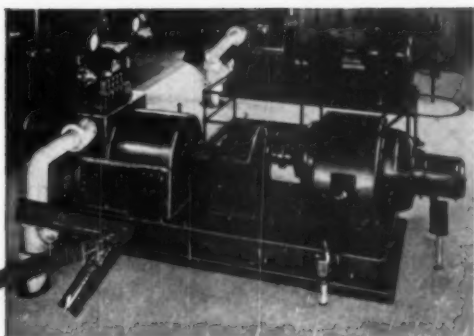
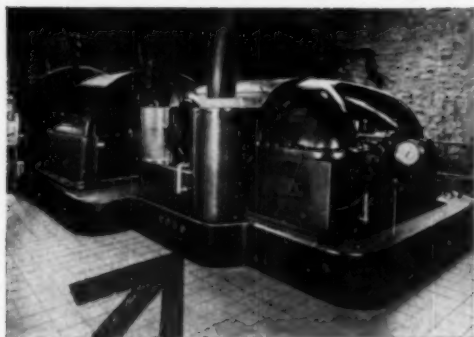
Sinclair Rubilene has always been a top-quality oil, as it has been constantly improved through the years, incorporating the latest technological developments in refining and processing. It resists oxidation under continuous high temperatures, and recirculation. It separates rapidly from water and is non-foaming. Through long periods of use it retains its original qualities, providing uniform, trouble-free lubrication and low maintenance costs.

Yes...Rubilene's finer quality pays dividends in the power plant.

# **SINCLAIR**

For lubrication counsel . . . see your nearest

SOUTHERN POWER & INDUSTRY for MAY, 1950



# REFINING COMPANY

Supplier of Sinclair Products or write to Sinclair Refining Company, 630 Fifth Ave., New York 20, N. Y.  
SOUTHERN POWER & INDUSTRY for MAY, 1950



# YOU DON'T HAVE TO PAMPER

## THE *"King-clip"* VALVE!

THIS STURDY IRON BODY GATE VALVE is built to stand the gaff of hard usage. It is a composite of the strong construction of the original "Clip" valve pioneered by Lunkenheimer many years ago and improved design features to meet modern-day conditions. It provides maximum resistance to distortion, piping stresses and wrenching strains.

Aside from its basic rugged proportions, the "KING-CLIP" embodies these distinctive features:

- non-corrosive stem-thread bearing cast in bonnet
- large drain channels that really drain the bonnet
- sharply tapered bronze disc that seats tight
- bronze rolled-in seat rings
- coarse stuffing box threads that resist corrosion and stripping
- hexagon head gland
- Lunkenheimer-developed stem material that eliminates stem-thread failure due to wear
- easy disassembly for servicing.

Ask for Circular No. 561 which illustrates the numerous patterns in which the "KING-CLIP" is available—iron body trim with bronze and various alloys, and all-iron . . . for a wide variety of services. You'll find one or more types which you can use to profitable advantage.



### LUNKENHEIMER DISTRIBUTORS

save you money...and "headaches"!

Distributors' stocks and service are a money-saving and time-conserving convenience. The more you use these handy facilities, the less you need spend for stock-room inventory and "stealing" for sources of supply. Call your Lunkenheimer distributor and profit from his unfailing service—not only on valves, but on the numerous other commodities necessary to keep industry in pace with the needs of these fast-moving times.

ESTABLISHED 1862  
**THE LUNKENHEIMER CO.**

—"QUALITY"—  
CINCINNATI 14, OHIO, U.S.A.  
NEW YORK 13 • CHICAGO 6 • BOSTON 10 • PHILADELPHIA 34  
EXPORT DEPT. CINCINNATI 14, OHIO, U.S.A.



Fig. 1640

Iron Body Bronze Mounted "KING-CLIP" Gate Valve 150 lb. S.P.—200 lb. W.O.G. For steam, water, gas, air, oil and gasoline service.

*The "King-clip" is king of all clip type valves!*

## Service continuity assured with system protection by I-T-E

Here's another electrical switching and protection problem solved—economically and positively. The I-T-E switchgear installed provides complete protection from point of power entry to individual feeder circuits.

### HERE'S WHY

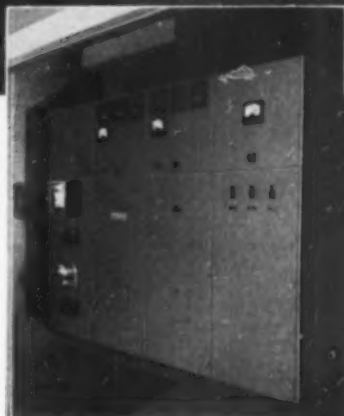
- Application was planned to fit a specific need.
- Equipment is effective and dependable.
- Units are properly coordinated.
- Design facilitates inspection and maintenance.
- "Packaged Delivery" simplifies installation.
- Full responsibility assumed.

### GET THESE HELPFUL BULLETINS

**On I-T-E 600 V Switchgear Assemblies:** A complete reference guide, containing detailed information on Multumite construction, and helpful facts for specifying and ordering complete switchgear installations. Ask for Bulletin 6003-D.

**On I-T-E 5 KV Assemblies:** Describes I-T-E's newest 5 KV Switchgear. Easy-to-read drawings and diagrams supplement photos and text. Ask for Bulletin 7000A.

Ask your local I-T-E Representative for these bulletins, or write I-T-E General Offices.



*Installation Photographs through courtesy of Hoffman La Roche, Inc., Nutley, N. J., Manufacturers of Pharmaceuticals.*

4000 KVA substation.

Incoming voltage 26.4 KV.

Outdoor structure layout prepared by R&IE\*.

Air break switches are type TTR rated 34.5 KV, 600 amperes.

Indoor switchboard is I-T-E type HV. Breakers are rated 1200 amperes continuous, 4160 volts, 150,000 KVA interrupting.

\*An I-T-E subsidiary.



Construction on Type HV switchgear emphasizes accessibility.

Circuit breakers of the HV type below are horizontal drawout truck mounted.

No transfer dolly or elevator mechanisms required.



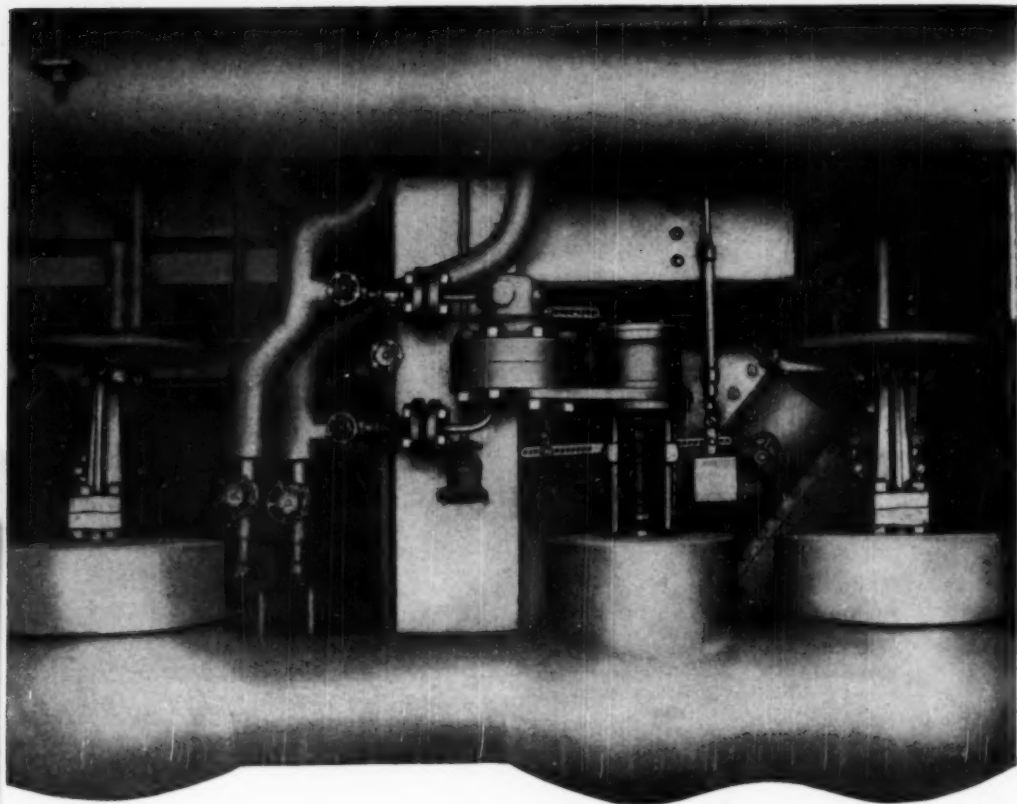
**For more dependable Switchgear**  
specify I-T-E!

I-T-E Circuit Breaker Company, 19th & Hamilton Streets • Philadelphia 30, Pa.

Power Switching Equipment: Railway and Industrial Engineering Co., Greensburg, Pa.

Canadian Mfr. & Sales: Eastern Power Devices, Ltd., Toronto • Export Sales: Philips Export Corp., N.Y.

SWITCHGEAR • UNIT SUBSTATIONS • ISOLATED PHASE BUS STRUCTURES • CIRCUIT BREAKERS  
MECHANICAL RECTIFIERS • RESISTORS • SPECIAL PRODUCTS



## How to hold boiler water level closely

When you want to hold boiler water level within close limits, no matter how widely or rapidly loads change, depend on COPES Flowmatic—the simplest, most widely used flow-level type of feed control.

This industrial installation, for example, is on a 660-psi Riley Steam Generator rated at 225,000 pounds per hour. Loads constantly fluctuate

10,000 pounds per hour over a total range from 150,000 to 265,000 pounds per hour. Yet water level is held within plus-or-minus one inch at all times.

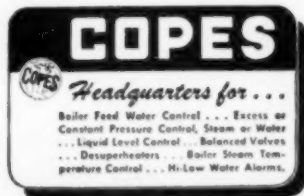
More than 1200 Flowmatic users like the coordination of influences from steam flow and water level to get the exact feed needed for close level control. They also like the ease with which plant personnel can

handle all maintenance.

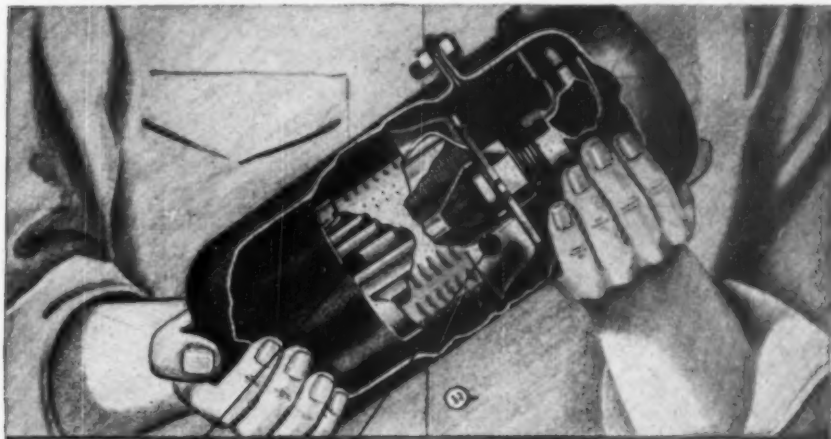
For a complete performance report on installation illustrated above, write for Bulletin 485.

**NORTHERN EQUIPMENT CO.**  
503 Grove Drive, Erie, Pa.

BRANCH PLANTS: Canada, England, France, Austria, Italy. Representatives Everywhere



# STAYNEW PIPE LINE FILTERS



**ELIMINATE**  
**MOISTURE**  
**OIL**  
**DIRT**  
**PIPE SCALE**

## from Compressed Air Lines

Tests prove that Staynew Filters often save their entire cost in just a few weeks. By preventing the passage of foreign matter, including moisture (water and oil), they prevent excess wear, costly freeze-ups, damage to materials and interference with processes.

### EXCLUSIVE DOUBLE-ACTION PRINCIPLE PROVIDES:

- ▶ **MECHANICAL SEPARATION**—Deflector Cup drives foreign matter to bottom of container where heavier particles are deposited.
- ▶ **FILTRATION**—air or gas rises thru the original Radial Fin Insert which removes the lighter material.



**IMPORTANT APPLICATIONS:** Protection of Air-operated Tools and Controls • Paint Spraying • Sand Blasting • Air Displacement or Agitation of Liquids

COMPLETE DETAILS ON REQUEST

## DOLLINGER CORPORATION

40 CENTRE PK., ROCHESTER 3, N. Y.

*Representatives in Principal Cities*



## QUESTION:

*What packings  
are resilient and  
flexible, but wear  
like metal?*



## ANSWER:

# Garlock METAL FOIL Packings

**COPPER** GARLOCK 906—Pleated copper foil with asbestos core for steam, air or gases (except ammonia) and hot oils of low sulphur content, at temperatures up to 1000° F.

**ALUMINUM** GARLOCK 913—Pleated aluminum foil with asbestos core for hot oils at temperatures up to 1000° F.

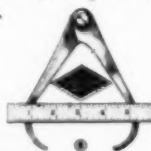
**LEAD** GARLOCK 917—Pleated lead foil with asbestos core for steam, air, oil, water, ammonia or other gases at temperatures up to 550° F.

GARLOCK Metal Foil Packings are constructed of thin metal foil spirally wrapped around a fibrous center core. The durability of metal wearing surfaces in contact with the rod or shaft is thereby combined with the resiliency of a fibrous packing.

A patented, pleated foil construction used in several of these new Garlock packings imparts unusual flexibility to the packing and permits the forming of rings without undue distortion of the material. GARLOCK Metal Foil Packings are recommended for centrifugal or reciprocating pumps, compressors, engines, expansion joints, etc. Write for descriptive folder.

THE GARLOCK PACKING COMPANY  
PALMYRA, NEW YORK

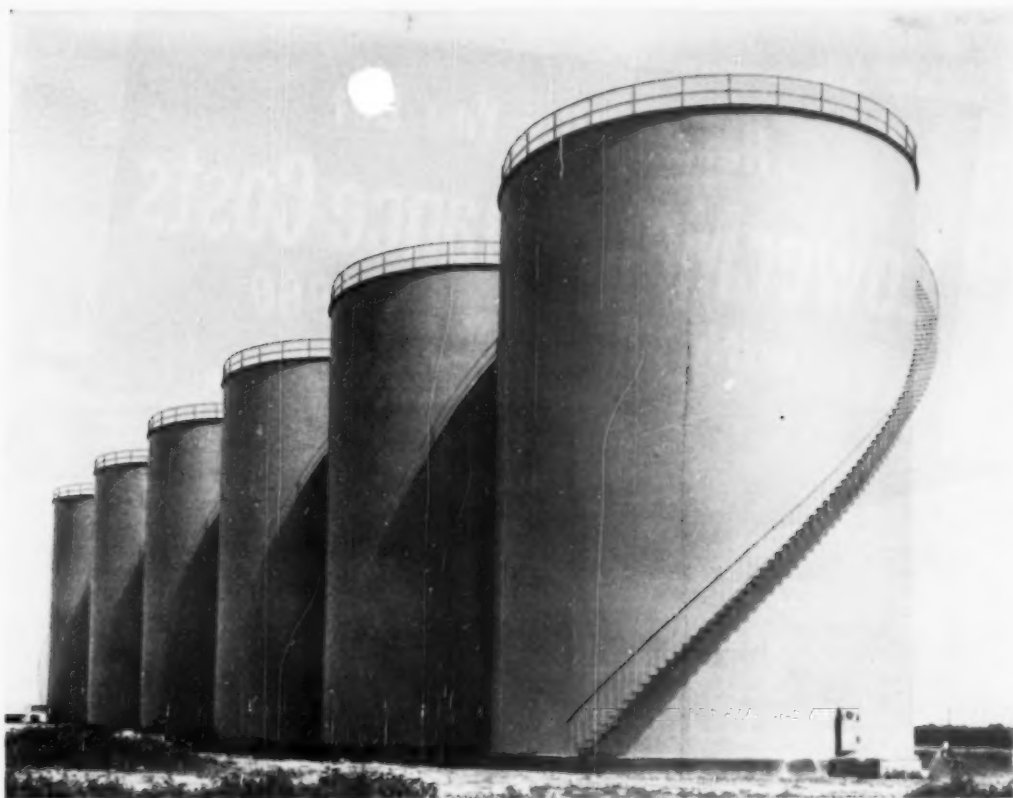
In Canada: The Garlock Packing Company  
of Canada Ltd., Montreal, Que.



# GARLOCK

PACKINGS, GASKETS  
AND OIL SEALS





## Welded Steel Tanks are EASY to MAINTAIN

You can expect low maintenance costs when you install Horton welded steel storage tanks. Here's why. The joints are built tight and stay tight. Regular painting prevents rusting and keeps the tank in good condition for years. There are no corners or crevices to collect dirt and invite corrosion.

You can expect to keep all other storage costs low because Horton welded tanks are built in a variety of styles for storing different materials. Self-supporting umbrella roofs are frequently furnished for tanks storing soy beans, cottonseed, and viscous or pulpy fluids (no inside columns to interfere with handling). For volatile liquids like gasoline and crude oil, these tanks are equipped with such evaporation prevention roofs as the Horton Double Deck Floating Roof. Tanks storing water, fuel oil, and liquids of low volatility

are usually built with low cost cone roofs.

Adequate, easily-maintained storage facilities are essential to efficient plant operation. Whenever you're thinking of storage, it will pay you to investigate the advantages of Horton welded steel tanks. Our Birmingham plant is strategically located to work closely with you. Let us offer quotations on your next storage requirements.

• • •

The battery of Horton steel tanks shown above holds 420,000 bushels of soy beans. The tanks are located at the Swift and Company's mill in Blytheville, Arkansas. Large fans located outside the tanks provide the air circulation that removes moisture from the beans.

Horton flat-bottom storage tanks are available in standard capacities up to 10,000,000 gallons or in special sizes to meet your particular needs.

## CHICAGO BRIDGE & IRON COMPANY

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Birmingham 1 ..... 1831 North Fifth St.  
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New York 6 ..... 3312-165 Broadway Bldg.

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San Francisco 11 ..... 1231-22 Battery St. Bldg.  
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# Here's Why You Get Lower Maintenance Costs with Chapman List 960

## 1. Gaskets!

Available with either metal to metal or gasketed joint as required.

## 2. 50% Stronger!

New design features compensate at points where excessive strain can develop . . . make stem and wedge gate connection 50% stronger than before.

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To keep your maintenance cost down the wedge faces are hardened to 800 Brinell by the exclusive Malcomizing process.

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When necessary, you can replace the seat rings easily . . . fast. Seat rings have wear-resisting and non-galling properties . . . made extra hard for years more service.

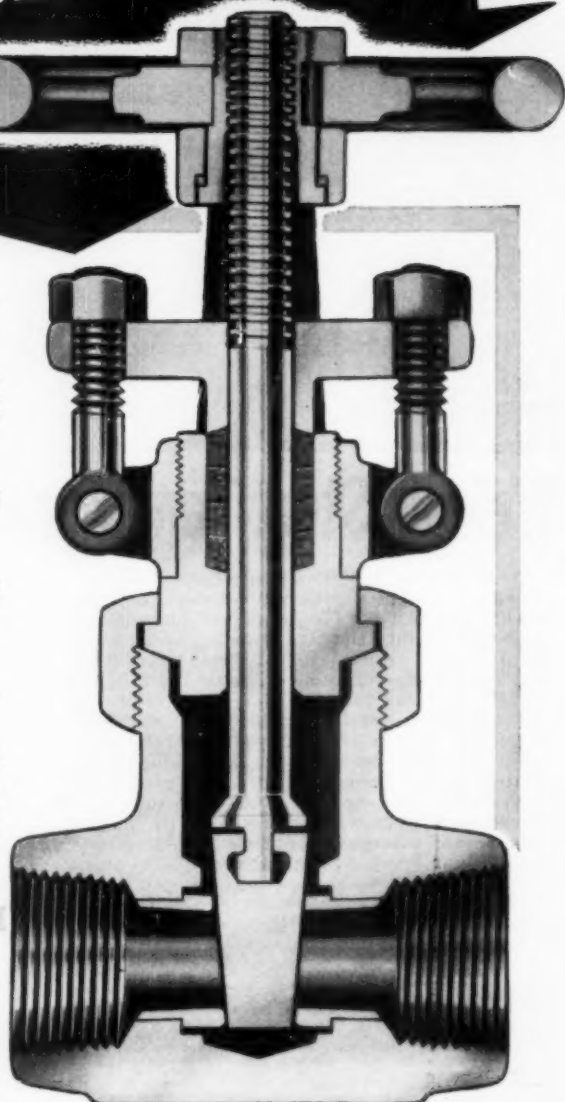
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No need for costly interruption of flow to repack.

But check this lower maintenance cost for yourself. Next time you buy specify List 960 in sizes from  $\frac{1}{4}$ " to 2". Rising stem with yoke (as illustrated) or rising stem inside screw type. For pressure range 2000 lbs. at 100 deg. F., 380 lbs. at 1000 deg. F. Specify List 990 for higher pressures.

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# Timely Comments

## Maintenance

**T**HE well known term *time studies* usually causes one to think immediately of the production line. But actually **TIMING** is nowhere more important than in maintenance. First, the maintenance supervisor has to know accurately how much time will be consumed by various repair jobs. And next, he must know how to time those jobs with operating requirements to avoid excessive machine outages. He must also be able to judge the time between scheduled maintenance steps to avoid breakdowns and yet get maximum use of working parts before replacement or repair. He must time his orders and deliveries of maintenance supplies to always have what is needed, and yet avoid excessive inventories.

Next to a fine sense of correct timing, perhaps the most important qualification for the maintenance head is a good sense of **BALANCE**. He is continuously balancing one contingency against another to choose the least expensive and most practical procedure. Maintenance is never convenient; it always interrupts operation, and it always costs money without directly producing any salable product. Shall he do a "quickie" job and get the machine back on the line—or do the job right and avoid another shut-down? Shall he let the machine limp along until its repair can be matched with other work, or do it now and prevent additional wear and speed up hourly output? Shall he hire extra men for speed or do it as fast as he can with existing crew? Shall he develop seldom used, special skills in his crew, or occasionally rely on outside specialists? All of these things, and many more, enter into his daily job of maintaining the best balance in his department.

And then there is **SALESMANSHIP**. The maintenance supervisor cannot expect to walk in and get the money head to approve an extraordinary maintenance expenditure without selling his point of view.

He needs to have the facts and state them clearly. He has no right to merely take an "I told you so" attitude. The maintenance manager is a part of management, and must contribute his part toward planning, coordination, and agreement.

Finally, he must be a good **PERSONNEL MAN**. He encounters more organizational headaches than the average production supervisor because he handles a greater variety of jobs and works men with more diversified skills. He must preserve some semblance of fairness to his crew—even while working one man 24 hours straight, and letting another off entirely to attend a sick wife. He must be able to help his men "point with pride to their accomplishments" even though there is no finished product to brag on. And **SAFETY**—he must be a genius at safety. It is hard to set up safety rules and procedures where the job is constantly changing.

Then after carrying all of the above duties with credit, he still has to be a **GOOD FELLOW**. A grouchy, unpopular maintenance man can be the plant's worst evil. Nearly anyone can trip him up, and nearly everyone can help him. He needs all the help he can get and therefore should know how to use oil in more ways than one.

Do you know such a man? Yes; probably you do. Good maintenance men seem to be the rule rather than the exception . . . and that is good luck for production.

• • • • •

**E**ACH article in this issue gives specific aid in planning and executing maintenance work. The material was supplied by men in the field that have intimate contact with such work. The editors appreciate the cooperation that has been received and are pleased to pass the information along to their readers.

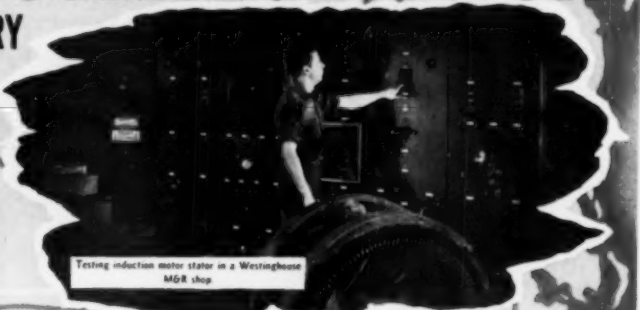
Write the editors—they welcome your suggestions, criticisms, and compliments. Your comments can help them in their efforts to give you the best possible information in every issue.

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# ELECTRICAL REPAIR HEADQUARTERS FOR SOUTHEASTERN INDUSTRY

In each of these three principal Southeastern cities, Westinghouse maintains a modern, fully equipped, electrical repair shop. Supervised by Westinghouse-trained engineers, and staffed with skilled Westinghouse repairmen, these plants are geared to give prompt, guaranteed repair service on all types of electrical apparatus. Southern textile and paper mills, chemical and power plants, transportation and general industrial electrical power users will find Westinghouse facilities plus Westinghouse know-how the surest way to uninterrupted production.



Testing induction motor stator in a Westinghouse MGR shop

CHARLOTTE

ATLANTA



Westinghouse balancing machine dynamically balances rotating apparatus



Inspecting the damaged D.C. Generator before completely rebuilding

BATON ROUGE

Because the same skilled workmanship and high grade materials are employed in repair work as in original manufacture, Westinghouse offers the same guarantee on completely rewound equipment as on new apparatus. For complete information on Westinghouse Repair Service, write or call one of the Westinghouse Manufacturing and Repair Shops listed below. Each has at its command the manufacturing and engineering facilities of the entire Westinghouse organization.

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# Industry Speaks

## Compulsory Retirement From Industry

BY A. D. MARSHALL  
Assistant Secretary  
General Electric Company

**C**OMPULSORY retirement at a predetermined age from the pressure of most industrial jobs is recommended as a means of promoting the emotional well-being of retiring workers and making room in industry for the increasing numbers of young men who will be seeking jobs in future years.

Increased life expectancy and the growing number of children approaching working age has posed the problem of finding jobs, even in an expanding economy, for all the people who will seek employment in future years.

A partial solution would be establishment of compulsory retirement systems in industry. Such systems also help to make easier the readjustment a worker must make at retirement.

### ADVANTAGES

A compulsory retirement age establishes the years after retirement as a reward for a lifetime of service to the company, rather than a period in which a worker has lost his usefulness to industry.

A compulsory retirement age in industry also maintains a worker's prestige with his family and friends. A man finds it hard to explain to his friends why the company is perfectly willing, even anxious to have him go on pension, yet believes that John Doe is so important to its operations that he cannot be retired.

### READJUSTMENT

While a worker should be retired under an adequate pension plan, it is not sufficient that preparations be made for his financial needs alone. He should be prepared also for the emotional readjustment of retirement.

One method of successfully accomplishing this readjustment, is a system now being used in some of the General Electric Company's operating departments.

Under the plan, personnel managers and individual supervisors interview each worker five years before his retirement to help him work out any personal problems he may have. From two years up to the actual time of retirement, frequent meetings with the employees are scheduled, and he is given any advice or assistance he requires.

After retirement the pensioner is visited one month, six months, and one year after leaving the company. Thereafter, he is visited once each year at which times an attempt is made to help him work out any new problems that may have arisen.

## Taxes Cost Worker 61 Days' Pay

BY ALFRED IDDLES  
President  
The Babcock & Wilcox Company

**T**HE average working citizen cannot call his pay his own until he has worked for 61 days—to support the Government. Still more Government spending now being discussed will, if permitted to become law, add about 20 more days' pay that the average worker must use to meet taxes.

A large part of the citizen's present taxes are hidden and added to the price he pays for food, clothing, housing, and even the simplest luxuries.

Sixty-one days' work a year for public debt is quite a lot, but what is even more alarming is that each year it grows by ever increasing jumps. Twenty years ago the average working man labored 10 to 12 days each year to pay taxes. Today he labors six times as long.

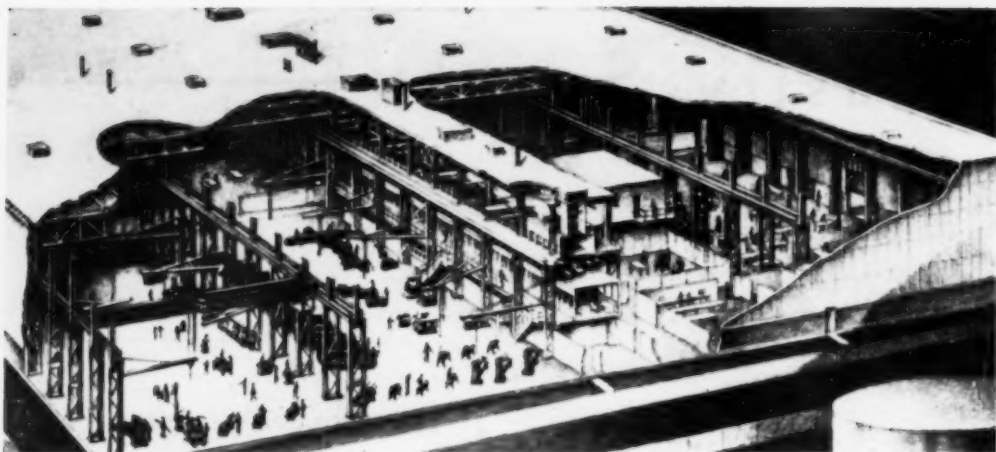
It is certainly our duty as citizens to support the Government by paying taxes, but it is also our duty to make sure that our taxes are spent wisely, efficiently and effectively.

### WE ALL PAY

The ever increasing public debt is a very serious problem. It is a personal problem for each of us. No matter whether we are called labor or management, Democrat or Republican, rich or poor, we all must pay. One of the greatest mistakes we make is to think the other fellow pays the taxes.

There is talk of shifting taxes from the things we buy to the corporations that make these things. This is misleading talk. When taxes are loaded on business, it is only an indirect way of loading them on each of us personally. Taxes are a part of the cost of making goods. These taxes may be hidden and we may not realize it, but each of us will surely pay these taxes in higher prices for the things we buy and use.





THIS ARTIST'S DRAWING OF ONE SECTION OF HUMBLE OIL & REFINING COMPANY'S NEW MAINTENANCE DEPOT IN BAYTOWN, TEXAS, CLEARLY INDICATES THE UNIQUE 20 FT FOUR LEVEL UTILITY BAY FLANKED BY TWO 72 FT SINGLE LEVEL BAYS. THE CONCENTRATION OF OFFICES, STORAGE UTILITY PIPING, POWER SUB-STATIONS AND PLENUMS HOUSING AIR CONDITIONING FANS, COILS, ETC., AFFORDS ECONOMY IN OPERATION AND EASY ACCESSIBILITY.

## Ultra Modern Maintenance Shop at Humble's Baytown, Texas Refinery

*Humble's new maintenance and repair shop in Baytown, Texas, has unique thermal and acoustical treatment, controlled conditions, a four level utility bay, and special design to combat the excessive corrosive conditions found in the area.*

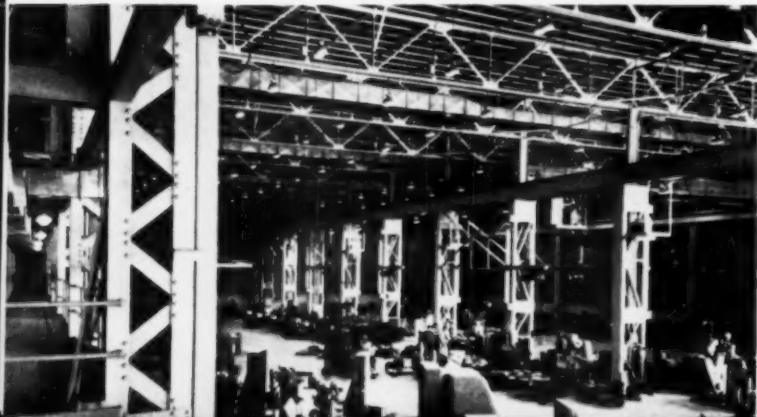
Staff prepared through the excellent cooperation of R. GLENN CHAPMAN, Project Engineer, THE H. K. FERGUSON COMPANY, Houston, Texas, and J. J. DVORAK, Chief Designer, HUMBLE OIL & REFINING COMPANY, Baytown, Texas.

**H**UMBLE Oil & Refining Company's Baytown, Texas, Refinery is one of the largest in the world. Maintaining such a huge

array of processing equipment requires a mechanical department of major proportions, qualified personnel, equipment and methods to

do specialized work, and buildings designed for efficient and economical maintenance operations.

Some of the new equipment and



THE SECOND LEVEL OF THE UTILITY BAY, PROVIDING OFFICES AND CONFERENCE ROOMS FOR FOREMEN, FIELD ENGINEERS, AND CLERKS, IS VISIBLE AT THE LEFT. IN ORDER TO PROVIDE JIB CRANES OVER ALL MACHINES, AND TRAVELING BEAM CRANES TO SERVE ALL PARTS OF THE SHOP, A CLEAR HEIGHT OF 27 FT 6-IN. BETWEEN FLOOR AND BOTTOM CHORDS OF THE TRUSSES IS PROVIDED.



FIRST UNIT OF HUMBLE'S VAST MAINTENANCE DEPOT, SHOWN HERE IN THE FINAL STAGES OF CONSTRUCTION, HAS BEEN OCCUPIED FOR SEVERAL MONTHS BY WELDING, ELECTRICAL, INSTRUMENT, AND MACHINE SHOP MAINTENANCE PERSONNEL. COMPLETION OF THE PROJECT WILL GIVE THE COMPANY'S MECHANICAL DEPARTMENT IN EXCESS OF 300,000 sq ft OF "CONTROLLED CONDITIONED" MAINTENANCE, REPAIR, AND STORAGE FACILITIES.

new methods employed by Humble were described in the September 1948 issue of *SOUTHERN POWER AND INDUSTRY*. That article noted specific case history data on the reduction of maintenance and repair costs in the mechanical department, and explained how the need for increased efficiency was presented to mechanical foremen and supervisors at the inception of a major cost reduction program. The orderly reduction of costs through general improvement in the use of materials and manpower that was accomplished, evolved largely from specific suggestions received from mechanical department personnel. These methods, equipment, etc., were described in detail in this article.

Supplementing the modern methods and equipment mentioned above, Humble has recently

completed another step in the company's long range modernization program. A huge, controlled conditioned maintenance depot brings under one roof all of the primary mechanical crafts, instead of having them scattered throughout the refinery area.

The windowless building is completely air conditioned, exhibits unique thermal and acoustical design in walls and ceilings, and is equipped with flexible overhead and jib crane handling equipment.

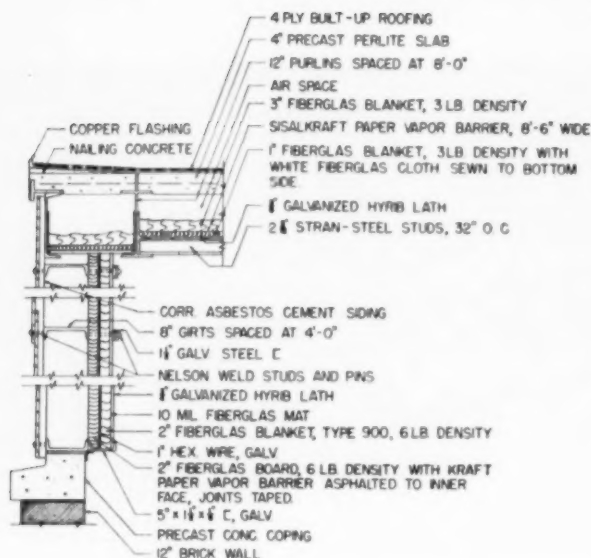
The maintenance center is already paying off. Several crafts grouped together can use common equipment and tools. A single bridge crane can serve several departments. Overall supervision is simpler and more efficient. Intercommunication is faster and easier. Duplication of labor and transportation is eliminated.

The completed portion of the repair and maintenance facilities building is 312 ft long by 308 ft wide, or around 96,000 sq ft. The second section, 168 ft long and the same width, is now in the final stages of construction, and a third section will undoubtedly follow completion of the second section. With the exception of the air conditioning equipment, which is installed in the second section, this discussion is confined to the initial 312 ft x 308 ft area. This section is 45 ft 8-in. high from finish floor to tops of purlins. In order to provide jib cranes over all machines, and traveling beam cranes to serve all parts of the shop, a clear height of 37 ft 6-in. between floor and bottom chords of the trusses is provided.

Design engineers of both the Humble Oil & Refining Company

CEILING CONSTRUCTION, FROM THE INSIDE OUT, IS EXPANDED METAL LATH, 1-IN. THICK SEWN GLASS FIBER INSULATION BLANKET FACED ON INNER SIDE WITH WHITE CLOTH WOVEN OF GLASS FIBER YARNS, SISAL KRAFT VAPOR BARRIER, AND 3-IN. THICK GLASS FIBER INSULATION BLANKETS BEING APPLIED HERE. IN THE BACKGROUND, 4-IN. THICK, LIGHT-WEIGHT PRECAST CONCRETE ROOF SLABS ARE BEING LAID AND TOPPED WITH BUILT-UP ROOFING.





and the H. K. Ferguson Company, who performed all detail engineering, emphasize that perhaps the most economically unique single feature of the building is the provision of four levels in the central or utility bay. This central bay is 20 ft wide and flanked on each side by two 72 ft single level bays. The 4-story center bay is of rigid frame construction and all lateral loads from wind, cranes, jibs, etc., are transmitted through the continuous roof trusses to this center frame.

At ground floor level in the center or utility bay, are located the

shop toilets, lube oil storage, janitor's closets, tool cribs, etc. Offices and conference rooms for foremen, field engineers, and clerks are on the second floor. The third level is a pipe gallery in which is located most of the utility piping for the entire shop—a 12-in., 20 lb steam line; a 6-in. industrial water line; a 4-in., 100 lb air line; a 1-in. instrument air; a 2-in., 65 psi propane; a 3-in. natural gas; a 1½-in. oxygen; two 16-in. chilled water lines; a 6-in. domestic water line; and a 1½-in. domestic hot water line. The fourth or top level contains unit power sub-stations and

WALLS AND CEILING WERE SUBJECTED TO UNIQUE THERMAL AND ACOUSTICAL TREATMENT. THE WHITE GLASS FIBER MAT IN THE WALLS AND THE WHITE GLASS IN THE CEILING WERE EMPLOYED FOR LIGHT REFLECTION AND TO PROVIDE A POROUS SURFACE THAT WILL PERMIT SOUND WAVES TO PASS THROUGH AND BE ABSORBED BY THE GLASS FIBER INSULATION.

plenums housing air conditioning fans, coils, and filters. The concentration of offices and shop services down the center of the building provides economy in operation and easy accessibility.

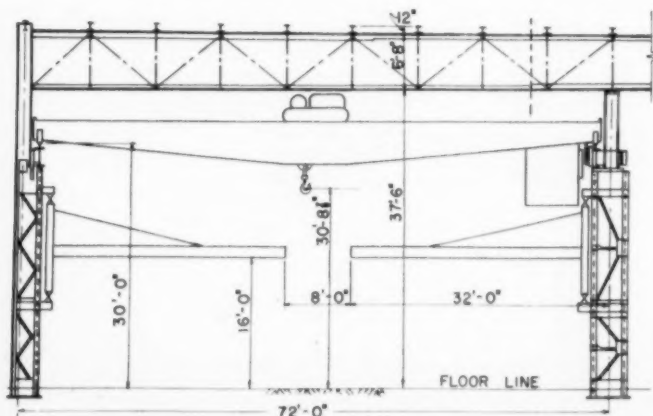
#### Wall and Ceiling Construction

Walls and ceiling were subjected to unique thermal and acoustical treatment. The side walls are built up, from the inside out, as follows: expanded metal lath, white glass fiber mat, 2-in. thick glass fiber metal-mesh insulation blanket, 2-in. thick glass fiber insulation board, air space and corrugated asbestos siding.

Cost of the corrugated asbestos siding was materially reduced by use of electric-arc stud-welding method of installation. Erection of the siding was handled completely from outside the building without necessity of erecting inside scaffolds.

Ceiling construction, from the inside out, is expanded metal lath, 1-in. thick sewn glass fiber insulation blanket faced on the inner side with white cloth woven of glass fiber yarns, sisal kraft vapor barrier, and 3-in. thick glass fiber insulation blanket. Above the ceiling is an air space, then 4-in. thick, light-weight precast concrete roof slab topped by built-up roofing.

The white glass fiber mat in the walls and the white glass cloth in the ceiling are employed for light reflection and to provide a porous surface that will permit sound waves to pass through and be absorbed by the glass fiber insulation.



CROSS SECTIONAL VIEW OF ONE 72 FT BAY SHOWING TYPICAL MATERIALS HANDLING EQUIPMENT INSTALLATION. EACH 72 FT BAY IS DESIGNED TO CARRY ONE 15 TON AND ONE 30 TON BRIDGE CRANE. OVER FORTY 30 FT JIB CRANES, SUPPORTING ½-TON, 1-TON, AND 2-TON CAPACITY HOISTS SERVE THE MAINTENANCE DEPARTMENTS.

## Air Conditioning

Principal air conditioning equipment will consist of one 1100 ton centrifugal freon refrigeration unit powered by a 1000 hp synchronous motor; one 550 ton centrifugal freon refrigeration unit powered by a 500 hp wound rotor motor; one cooling water pump, 4,000 gpm at 80 ft head, driven by a 100 hp, 1750 rpm motor; one cooling water pump, 2,000 gpm at 80 ft total head, with a 50 hp, 1750 rpm motor drive; one chilled water pump, 2000 gpm at 120 ft head, with 75 hp, 1750 rpm motor; one chilled water pump, 1000 gpm at 120 ft head, with 40 hp, 1750 rpm motor; and a two section cooling tower. Space will be provided for the future addition of two 1100-ton units.

Specifications require that during the summer months the inside temperature shall be maintained at 78 F, when the outside dry bulb temperature does not exceed 95, or the outside wet bulb temperature does not exceed 80. Relative humidity is not to exceed 50 per cent. In winter, the temperature is to be maintained at a minimum of 72, when the outside dry bulb temperature is 20 or above and a relative humidity of at least 30 per cent is to be maintained when the outside dry bulb temperature is above 32. Heat loads in various parts of the building will vary and the building is zoned to meet this requirement.

The conditioned area consists of ten independently controlled heating and air conditioning zones where 48,000 cfm blowers discharge through supply duct systems into several 6100 cfm adjustable ceiling type outlets installed 40 ft above the floor in the main working areas. Distribution to closed areas in the 4-floor central utility bay is through side wall grilles. Utilization of these ten independently pneumatically controlled zones minimizes the amount of distribution ductwork.

The conditioning system operates on the reheat principle, and each zone is controlled independently by a temperature and humidity controller. The system of pneumatic control operates as follows: the preheat coil maintains a minimum leaving air temperature of 50 F.

The temperature of the chilled water to the cooling coil is controlled by a three-way mixing valve which is controlled either by the zone thermostat or humidistat, whichever is calling for the coldest water. If the temperature of the air leaving the cooling coils has been reduced below 78 F in order to reduce the relative humidity to 50 per cent the reheat coils restore the final temperature to 78 F.

If the outside air temperature falls below 32 F, the outside air thermostat closes all humidifiers to prevent condensation occurring within the walls and ceiling.

Another interesting feature is provided to help maintain desired temperature. If one or more vertical lift doors are opened on both the east and west sides of the building (opening electrical circuit through a relay coil), the outside air dampers will close and the return air dampers will move to full open position.

Sixteen 48-in., 17,600 cfm roof supply ventilators will provide ventilation until the building is air conditioned.

## Materials Handling

Jib cranes are literally all over the place in Humble's vast maintenance building. Over 40 30-ft. jib cranes, supporting 1/2-ton, 1-ton, and 2-ton capacity hoists serve the various jobs. In addition, each 72 ft bay is designed to carry one 15-ton and one 30-ton bridge crane.

Both electric hoists and air hoists are used.

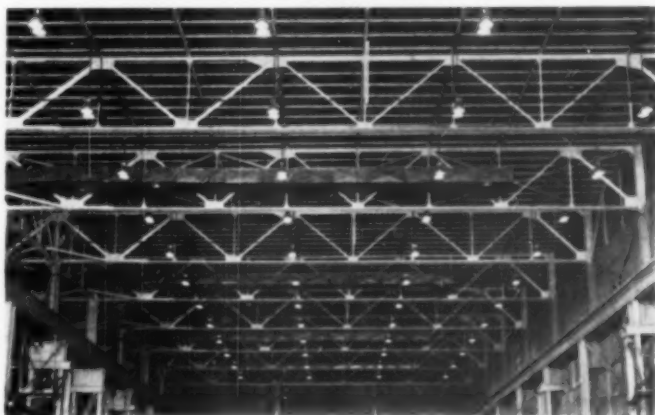
Due to atmospheric conditions, extensive use has been made of nonferrous metals in the building design. For example, 3S aluminum was used for all air conditioning ducts and monel wire was used to attach the glass fiber blanket to the galvanized expanded metal sheet used in the wall construction. In addition, all wire partitions in the building and exposed exterior steel doors are galvanized.

The main floor of the building is concrete slab, smooth trowel finish, poured 24 feet square fashion with no expansion joints. On the mezzanine floor of the utilities bay all offices, conference rooms, women's lounge, and closets have asphalt tile floors over concrete slab. All office partitions are removable steel sections, permitting flexibility.

The building is windowless and combination mercury arc and incandescent lighting units in the shop provide 35 ft candles at working level. All offices have fluorescent lighting. On some machines the shop lighting is supplemented by individual incandescent fixtures at the point of work.

Wiring to machines is generally run in under-the-floor conduits. Air circuit breaker power distribution cabinets are fed 3-phase, 440 v power from three 2400/480 volt dry type unit substations located in the top level of the utility bay.

MAINTENANCE DEPOT IS WINDOWLESS AND COMBINATION MERCURY ARC AND INCANDESCENT LIGHT UNITS PROVIDE 35 FT CANDLES AT WORKING LEVEL. ON SOME MACHINES, THE SHOP LIGHTING IS SUPPLEMENTED BY INDIVIDUAL INCANDESCENT FIXTURES AT THE POINT OF WORK.





A VIEW OF THE WESTINGHOUSE ELECTRIC CORPORATION'S REPAIR SHOPS IN ATLANTA SHOWING THE WIDE VARIETY OF REPAIR JOBS THAT ARE DONE FOR ALL TYPES OF INDUSTRY THROUGHOUT THE SOUTHEAST.

## — Electrical Maintenance

**A**FTER a lengthy sales talk on his farm maintenance book, the salesman asked the farmer why he would not buy it. To this the farmer replied, "I already know how to maintain this farm better than I am doing." Like the farmer, most plants are not doing as good a maintenance job as they know how to do. The purpose of

this paper is to encourage them to do a better job and to emphasize certain fundamental procedures that should help them with that task.

### Systematic Procedure

The first requirement in any maintenance program is a systematic procedure and adequate rec-

ords. A definite schedule should be established to include several classes of inspection. For instance, some plants have one or all of the following inspections: weekly, monthly, semi-annually, and annually. Each class of inspection includes different procedures. Usually the weekly or monthly inspection is mostly routine, such as

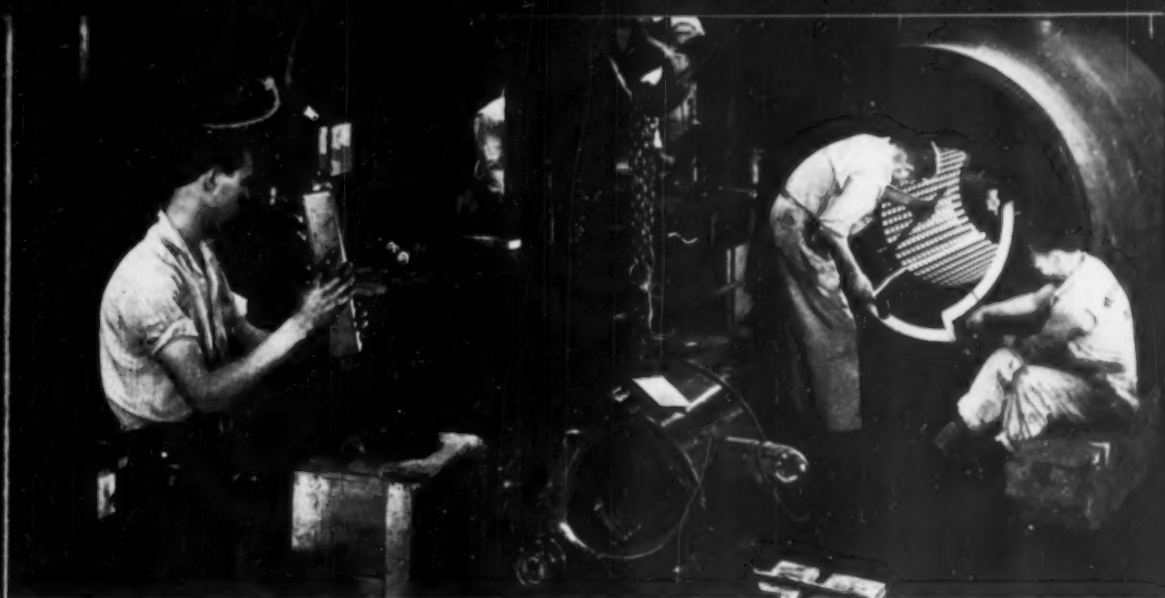


### By B. J. Sturman, Jr.

Electrical Engineer, Repair Dept.  
Westinghouse Electric Corporation  
Atlanta, Georgia

The author emphasizes the importance of record keeping as an aid to a practical plant maintenance program. Also complete manufacturer's information including parts lists, instruction bulletins and wiring diagrams is needed for major repair projects.





TYPICAL ELECTRICAL REPAIR JOBS HANDLED BY THE ATLANTA SHOP. REWINDING OF A LARGE A-C MOTOR IS IN PROGRESS AT RIGHT. THE D-C MOTOR IN FOREGROUND IS REPAIRED AND READY FOR SHIPMENT.

## Essentially Mechanical —

checking lubrication or checking the actual operation of the machine.

The plant maintenance inspector should have a general knowledge of the electrical and mechanical characteristics of the equipment involved. This man is truly a jack-of-all-trades. Not only must he be an electrician and a mechanic, but also sometimes a plumber and a carpenter. To top it all off, he is usually well rounded in practical engineering. The maintenance man should have available all instructions from the manufacturer of the equipment. This will enable him to make minor repairs and adjustments. There are many cases where a maintenance man spends days, or even weeks attempting to service or adjust a machine whereas, if he had the proper instructions, the job could be done in a matter of hours. These instructions are also very important from a standpoint of safety. Many people have lost their lives while working on equipment because of lack of proper information.

The following are the minimum

***A good electrical maintenance man must also be a good mechanic. While based on electrical knowledge, his actual work is mechanical and must be done skillfully and accurately.***

requirements in tools and instruments in a plant maintenance program. Of course, other equipment will be needed to meet the application or local conditions.

1. Tools for dismantling apparatus
2. Feeler gauges
3. Inside and outside micrometers
4. Dial indicator gauge (truth gauge)
5. Megohm-meter
6. Electrical Instruments and Thermometers
7. Vibrometer

A portable oil testing set is needed in the maintenance of transformers and oil circuit breakers.

### **Insulation Resistance**

Cleanliness is the basic requirement in maintaining electrical

equipment. Most failures, particularly in motors and generators, are insulation failures caused by a collection of dirt or moisture in the winding. Not only should electrical equipment be protected from dirt and moisture, but also against oil, acid, alkalies, chemical compounds, gases, etc. All of these may cause deterioration of the insulation or corrosion of metal parts.

It is recommended by the American Institute of Electrical Engineers that the insulation resistance of stator windings and armatures of clean dry machines at approximately 75 C be not less than that given by the formula,

Insulation Resistance in Megohms = Rated Voltage ÷ [(Rated kva ÷ 100) + 1000].

The minimum resistance of insulation of the fields should be in

Table I

## Effect of Unbalanced Voltages on Performance of Typical Three Phase Motors

Motor	Volts across Each Phase			Amperes in each Phase			kw Input	Balanced Amperes per ph	Voltage kw input	% max. Volts above min. volts	% max. amps above min. amps	Full-Load Efficiency	
												Un-balanced Voltage	Balanced Voltage
20 hp	440	368	440	45.2	36.8	25.6	18.2	33	17.9	20	76	82	83.5
30 hp	446	380	430	53.6	52.5	24.7	26.8	40.5	25.4	17	117	83.5	88

The 20 hp motor is rated at 440 volts, 3 phase, 60 cycles, 16 poles. The 30 hp motor is rated at 440 volts, 3 phase, 60 cycles, 8 poles.

Table II

## Effect of Unbalance on Temperatures in a 35 hp, 3 phase, 440 v, 2 Pole Motor

## Temperature Rise in Degrees C

Volts across Each Phase			Amperes in Each Phase			Primary Core	Primary Coil PhA PhB PhC			Rotor
440	442	440	48	53	54	37	37	35	32	50
428	372	423	73	58	32	48	66	51	41	60

order of one-half to one megohm, depending on the size of the machine. It is rather general practice of insurance companies to demand an insulation resistance of one megohm per thousand volts of operating voltage with a minimum of one megohm on apparatus that is insured.

Insulation resistance measurements should be made at regular periods. A megohm-meter is most convenient for this purpose. Where five hundred volts direct current is available, a high resistance voltmeter will give fairly satisfactory results, the methods of measurement being first to read the voltage of the line, then to connect the insulation in series with the voltmeter and take a second reading. Insulation resistance is then calculated by the formula:

$$R = \frac{r(V-v)}{1,000,000}$$

Where: V = Voltage of the line.

v = Voltage reading with insulation in series with voltmeter.

r = Resistance of voltmeter in ohms.

R = Resistance of insulation in megohms.

When an insulation resistance test is made on electrical equipment, the results are of little value unless one has kept records of previous readings or has other data for comparison. High insulation resistance does not insure high dielectric strength. Such measurements, therefore, are of value only if the respective resistance readings are relative values taken on the same apparatus under similar conditions. The most important of these conditions is temperature. Insulation resistance varies inversely with temperature. As an approximation, the value will be halved with each 10 degree rise in Centigrade temperature. For example, a motor winding measuring 1000 megohms at 30 C will measure approximately 31.25 megohms at 80 C.

There are other techniques of determining the condition of insulation. Generally, the megohm-meter is the plant electrician's sole

tool for insulation testing, and he needs to become thoroughly familiar with that instrument and its practical use. Other, more elaborate tests must normally be handled by technicians in particularly well equipped repair organizations.

After determining the condition of the insulation, various tests can be applied, such as: Dielectric tests, overpotential tests, high frequency tests, dielectric power factor tests, or surge comparison tests. But under normal conditions all of these tests are not needed and some cannot be readily handled by the usual plant maintenance crew.

## Warnings

There are two distinct warnings of approaching trouble on electrical machinery: (1) high temperatures, and (2) vibration.

A sharp rise in temperature of a winding or bearing should be investigated immediately. Under normal operating conditions, neither the winding nor bearing should be allowed to exceed a total rise of 90 C without class B or special class H insulation for windings and special lubricating materials for bearings. Note that this is total temperature rise and not the rise over ambient.

Mechanical vibration is usually a sign of approaching mechanical failure. On rotating apparatus, convenient checks can be made periodically with a vibrometer.

Voltage unbalanced seriously affects the operation of sensitive apparatus and, if great enough, will cause the winding of an induction

motor to roast due to over-excitation. A difference in phase voltage not exceeding 10 per cent is generally permissible; however, by referring to Tables I and II, you will find typical examples of voltage unbalanced.

#### Current Collectors

The proper care of commutators and collector rings, along with brushes, brushholders, and spring tensions will save many man hours of outage and loss in production. When necessary, the rings or commutators should be trued by turning in a lathe, and particular attention given to the undercutting and sidecutting of the commutator. If it is necessary to renew brushes, it is extremely important to install the correct grade. Correct brush pressure and brushes free in their holders are of vital importance.

#### Lubrication

A periodic schedule of lubrication is of great importance in rotating equipment. The frequency of lubrication checks depends upon the application and the operating conditions of the equipment. Bearing troubles are usually due to one of the following causes:

1. Lack of oil.
2. Excessive belt tension.

3. Failure of the oil rings to revolve with the shaft.
4. Rough bearing surface.
5. Improper fitting of the journal boxes.
6. Bent shaft.
7. Misalignment of shaft and bearings. Equipment may be out of line when loaded—even though it checks OK when stopped. Belt strains may flex shaft and affect alignment. Pulleys should be located close to bearings.
8. A poor grade of oil or dirty oil.
9. Bolts in the bearing cap may be loose.
10. End thrust due to improper leveling. A bearing may become warm because of excessive pressure exerted by the shoulder of the shaft against the side of the bearings.
11. End thrust due to magnetic pull. This is a magnetic alignment problem.
12. Excessive side pull because the rotating part is out of center.

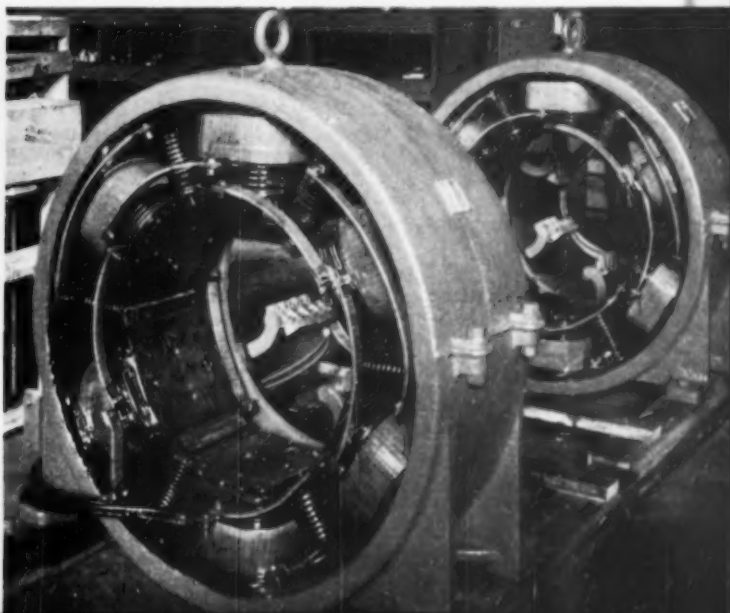
If the bearing becomes hot, first reduce the load if possible and feed lubricant freely, loosening the nuts on the bearing cap, and if the machine is belt connected, slacken

the belt. If this does not give relief, try to keep the machine rotating slowly until the shaft is cool to prevent the bearing from "freezing". Renew the oil supply before starting again.

A new machine should always be run unloaded or in case of a variable speed motor, at slow speed for an hour or so in order to see that it operates properly. The bearings should be carefully watched to make sure the oil rings are revolving and carrying a plentiful supply of oil to the shaft.

There are two outstanding problems in connection with the use of sleeve bearings that have troubled engineers and have led development of the ball and roller bearings. The first problem is that of the oil film separating the stationary part from the rotating part. When the machine is at rest there is no oil film or separation. The other problem deals with lubrication—sleeve bearings necessitate special sealing arrangements to keep the oil within the bearing housings. The grease lubricated ball or roller bearing is free of these objections and has therefore presented itself as a solution. There are, of course, other advantages and disadvantages in both types of bearings.

CLEANLINESS IS THE BASIC REQUIREMENT IN MAINTAINING ELECTRICAL EQUIPMENT. MOST FAILURES, PARTICULARLY IN MOTORS AND GENERATORS, ARE INSULATION FAILURES CAUSED BY A COLLECTION OF DIRT OR MOISTURE IN THE WINDING. FIRST STEP IN REPAIR WORK IS A THOROUGH CLEANING. THIS BEFORE AND AFTER VIEW, IN THE WESTINGHOUSE ATLANTA SHOPS SHOWS A LARGE D-C GENERATOR FIELD AS RECEIVED AND AS SHIPPED.



In connection with ball or roller bearings, quietness and life depend largely upon cleanliness and proper lubrication. If practical, it is usually desirable to open the housing of such bearings once a year (or after every 5,000 hours operation) to check the condition of bearings and grease. The sealed, pre-lubricated bearing, however, requires attention no oftener than every five years, and some of this type are recommended to operate for life without new grease. When re-lubricating, use of only a small amount of lubricant is essential. Too much grease will cause overheating and leakage of both ball and roller type bearings.

#### Mechanical Details

It is customary to think of failures in connection with electrical equipment as electrical or insulation failures. Many such failures, however, are strictly mechanical, and a surprisingly large percentage, although electrical, are due to mechanical causes.

An unusual noise in electrical apparatus may be caused by vibration due to (a) unbalanced or bent shaft, (b) obstruction of the ventilating system, (c) loose parts, (d) faulty alignment, (e) system disturbance, or many other abnormal conditions.

No simple device is available for locating the source of or analyzing the noise. The action taken must depend upon the judgment and experience of the inspector.

#### Air Gaps

Air gap adjustments are closely associated with bearing maintenance. In most cases of machines with sleeve bearings, the air gap measurement can be used to determine bearing wear. Caution should be used especially on larger machines where adjustment may affect the alignment.

#### Belts

The maintenance of belts in most large organizations is handled by specially trained personnel. Application of belts involves alignment problems and belt tensions affect bearing operation.

When it is necessary to replace vee belts, it is important to replace the whole set with matched belts.

Replacing only some of the belts results in uneven tension and tends to encourage excessive tightening and bearing failures. Belts not free from deformation or deposits will, in most cases, cause a noisy drive. This is particularly objectionable in air conditioning drives.

#### Transformers

Oil filled transformers are usually relatively trouble free, but periodic checks on the load and oil level are essential. On the larger units small amounts of oil can be drawn from the sampling device for test purposes. Making dielectric tests on transformer oil is not a complicated procedure, but a special test machine is needed and tests need to be made with extreme care to assure accuracy. Those making such tests will require specific instruction which may be had from the manufacturer. The American Standards Association recommends that the dielectric strength of transformer oils when shipped be not less than 26 kv as measured by standard methods.

Oil of transformers in service should not be allowed to have dielectric strength of less than 19,000 v. When the oil does not meet this level, it can usually be improved by filtering through a filter press.

In water-cooled transformers where the cooling is obtained by copper coils and circulating water, it is extremely important to have water free of sediment and sand. Such particles will in time wear through the best of cooling tubes.

#### Circuit Breakers

The entire subject of circuit breaker maintenance would require a full-length article for adequate discussion. Therefore, only a few important points can be briefly covered here.

Among the most important points to be observed in the maintenance of oil circuit breakers are (1) condition of the oil, (2) condition of contacts, both main and auxiliary, (3) checking the operating mechanism to make sure it works freely and yet provides positive closing, latching, and tripping, (4) checking minimum trip voltage of trip coil. During a fault condition, the voltage at the break-

er may drop to a value considerably below normal. The trip coil is designed to have positive tripping characteristics at these lower voltages. The minimum trip voltage for checking purposes is given in the manufacturer's instruction manual. The inspector should, while observing their condition, lubricate pins and bushings subject to wear and see that all cotter pins are in place.

In the adjusting or fitting of contacts, the manufacturer's instruction book should be followed closely.

#### Insulation Materials

The maintenance of electrical apparatus is to a large extent the maintenance of insulation. Bearings, commutators, collectors, regulators, instruments, and circuit breakers require adjustments and repairs, but all can usually be continued in operation at least until an orderly shutdown can be arranged. When insulation fails, however, it is considered extremely fortunate if only a temporary shutdown results. It is important to have an understanding of the characteristics of insulating materials if misapplication is to be discovered by the maintenance man before trouble occurs.

A motor adequately insulated for boiler room application might fail very soon if applied to a sump pump or to some paper mill drives. The converse is also true, for the best moisture-resisting insulation is not the most suitable for very high temperature service.

Plants that have seasonal operations such as cotton gin mills should give particular care to insulation during the off season. An idle machine will, in most cases, collect moisture in the windings which might result in failure when re-starting. There are even applications in humid atmospheres where overnight shutdowns have caused troubles. In all these cases it is necessary to keep the windings warmer than room temperature during shutdown periods. This is usually done with space heaters or by other convenient methods.

Periodic checks of insulation resistance with a megohm-meter as brought out previously are essential in the preventive maintenance

of insulation. Scheduled shut-downs must be arranged so the apparatus can be thoroughly cleaned, and in the case of stators, rotors, and armatures, dipped in insulating varnish.

Insulating varnishes are of great importance in the electrical industry and particularly so in maintenance. An insulating varnish is a chemical compound of varnish gums and drying oils having high dielectric strength and other properties that afford protection to the windings of electrical apparatus. There are many distinct types of insulating varnishes in general use. Of these, the thermosetting type is probably the most universally used in plant

maintenance. This type varnish, which is a synthetic resin of the phenol-formaldehyde series, will cure by heating alone and does not require oxygen.

Periodic cleaning, dipping, and baking will preserve the surfaces of insulation. There are many applications where a motor is subjected to an abrasive atmosphere, and the varnish is literally worn off by the abrasive action. In such cases, thermosetting varnish has been the answer in the prevention of insulation failures.

#### Importance of Inspection Reports

The duties and responsibilities of the electrical maintenance in-

spector are extremely important. The recognition which his work will receive depends largely upon his reports. Operating executives are likely to be too engrossed in other affairs to give much consideration to maintenance inspection until the equipment fails, unless inspection reports emphasize doubtful or dangerous conditions. The organization which includes maintenance inspectors who supplement good inspection with good reports and an electrical superintendent or operating executive who takes prompt action when questionable or unsafe conditions are reported will have low maintenance cost and few interruptions of operations.

## Waste Heat Recovery Leads to Large Savings

**R**ECOVERY of waste-heat from air compressors and their driving engines can result in very worth-while savings where the recovered heat supplies Btu's for which coal, oil or gas would have to be burned.

In one plant, three 315 cubic feet per minute compressors, two driven by diesels and the third by a spark-ignition engine using manufactured gas fuel, deliver about 400,000 Btu's per hour into a system suitable for space or process heating.

Careful design and layout is necessary to assure that capital and maintenance cost of recovery equipment does not offset too much of the cash value of Btu's recovered.

In the arrangement shown here, the engine compressors are teamed with unit heaters. The engines are equipped with marine-type water-cooled manifolds. Water coming off the engine jackets thus picks up Btu's that would otherwise be exhausted to the atmosphere and wasted. Water is taken directly from the discharge of the engine-compressor cooling system and circulated by the engine pump through the heating equipment.

Certain controls are necessary. There should be a control in the

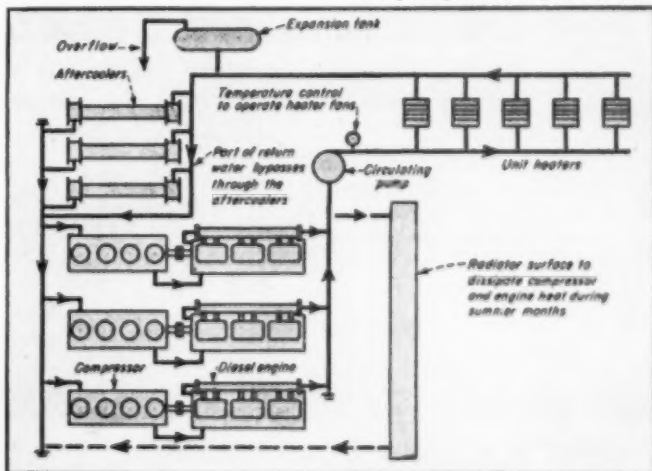
hook-up to keep unit-heater fans from operating before water reaches a pre-set minimum temperature. This prevents blowing cold air.

For heat dissipation in the summer months, the water can be circulated just as before, but the unit heater fans are reversed to discharge outside the building.

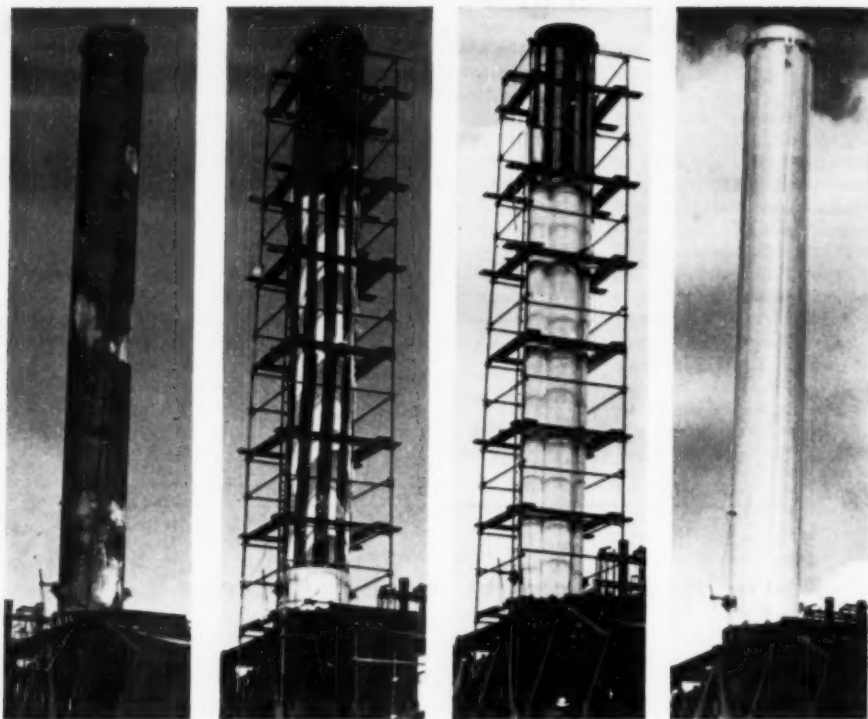
In a case such as this one, the cost of equipment and piping necessary to recover heat and put it to work is relatively small and the scheme results in real dollar savings. The heat recovered is approximately 1250 Btu's per hour per cubic foot per minute of compressor capacity at 100 pounds per square inch.

HEAT-RECOVERY HOOKUP SHOWS THE WATER FLOW THROUGH AFTER-COOLERS, COMPRESSOR JACKETS, ENGINE JACKETS AND MANIFOLDS, TO PICK UP BTU FOR CIRCULATION TO HEATERS.

Courtesy Compressed Air & Gas Institute







INSTALLATIONAL VIEWS OF ALUMINUM JACKETING BEING APPLIED TO A FURNACE STACK AT THE CITIES SERVICE REFINING CORPORATION PLANT AT LAKE CHARLES, LOUISIANA. SHEETS ARE MOUNTED ON VERMICULITE BLOCKS AND FASTENED TO EACH OTHER WITH ALUMINUM SCREWS. INSTALLATIONAL COST WAS \$412 COMPARED WITH ABOUT \$200 FOR PAINTING, BUT SERVICE LIFE HAS ALREADY TRIPLED THAT OF THE AVERAGE PAINT COATING.

## Aluminum Jackets for Boiler Stacks

***Maintenance engineers at this Lake Charles, Louisiana refinery use aluminum jacketing in lieu of paint for furnace and boiler stacks. Installation described was made in May, 1949, and has already rendered service triple that of average paint coating.***

**F**URNACE and boiler stacks are very difficult to maintain in a well painted condition because of elevated temperatures and atmospheric exposure.

Much credit is due the paint manufacturers for their constant efforts to cope with the problem and there is no doubt that the comparatively new silicone formulations are a far cry from the days when locomotive boilers were rubbed down with a mixture of

**By  
Richard S. Freeman**

**Cities Service Refining Corp.  
Lake Charles, Louisiana**

lampblack and kerosene. However, even in view of such progress, it is still quite difficult to obtain satisfactory service from paint coatings on these hot stacks.

In attempting to solve any problem one of the foremost questions to be considered is "Why?" Certainly in the case of a stack there is no serious corrosion problem to contend with when elevated temperatures preclude the presence of moisture. Therefore, in our operations the need of painting a stack resolves the problem to one of appearance and not protection. The most satisfactory solution will be the one affording the best appear-

ance for the longest time at the least cost. It is believed that such a solution has been found in using aluminum sheet metal to form a jacket around the stack in lieu of painting.

#### Case History

The installation to be described was made on the stack of a small, typical furnace as found in many refineries. In contrast to other nearby equipment, the stack presented a very poor appearance the majority of the time. Being efficiently insulated internally, this stack had an average skin temperature of not over 500 F even though the flue gases flowing through it approached 1,000 F as they left the fire box. But the 500 F temperature plus atmospheric exposure caused the life of various paint coatings to be very limited, in some cases as short as thirty days. This does not mean all of the paint coating was destroyed in thirty days; but, from an appearance standpoint, even failure of five or ten per cent of the coating is of practically the same consequence as if it all had failed.

The installation was made in May, 1949, and after a year's service, is of practically the same appearance as when initially installed. It is believed that the jacket, which has already rendered a service triple that of the average paint coating, will continue to give excellent service for a very long, indefinite period of time.

#### Installation

The aluminum sheets are 0.024 in. thick and approximately 10 ft long by 3 ft wide. The alloy is 3S,  $\frac{3}{4}$  H and the surface is the unpolished mill finish. The separated vertical courses visible along the length of the stack are 1 in. x 3 in. x 30 in. vermiculite blocks wired in place with aluminum wire drawn sufficiently taut to prevent slippage of the blocks.

By placing the distance between center-lines of the vertical courses at 18-in., an air space of 15-in. in width is created through which fresh air will circulate. The aluminum sheets are then placed on top of the vermiculite blocks with the length of the sheet extending horizontally around the periphery of

the stack. The sheets are overlapped in such a way that the bottom edge of each sheet extends over the top edge of the sheet beneath, so that no crevice is formed in which foreign matter might accumulate. The sheets are fastened to each other with aluminum screws.

The open space between the jacket and stack at the top extremity is closed by making a weather seal which prevents the entrance of foreign matter between the two surfaces. Immediately below the painter's trolley a series of 2-in. holes are cut in the jacket, spaced uniformly around the stack. At the bottom extremity of the jacket, semi-circular openings of corresponding size are cut. Because of the convection currents created by the heat being emitted from the surface of the steel stack, fresh air is drawn in the bottom openings and expelled through the top

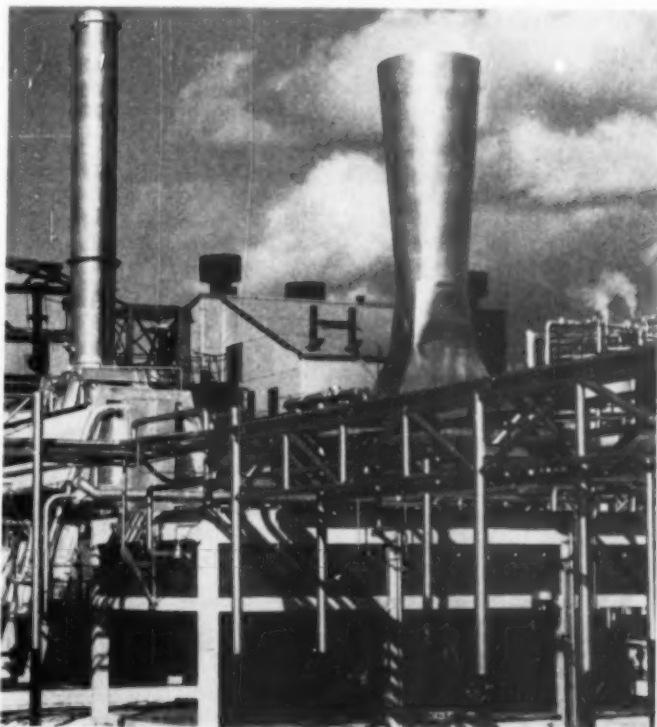
openings, thus setting up constant circulation.

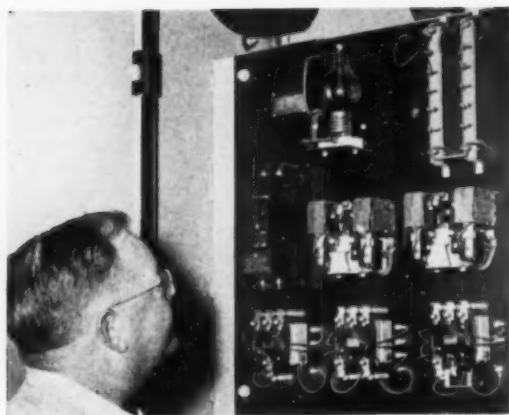
#### Installational Cost

The expense incurred on this installation for labor and materials was \$412. Similar expense for painting this stack was \$200, or approximately one-half. Therefore, if the length of service afforded by the jacket was twice as long as that afforded by a paint coating, the actual cost of the jacket would be no more than for painting. As the jacket continues to give service, its cost becomes less and less as compared to that for painting. Although the cost will be affected by varying factors with each job, a similar relationship should hold true in all cases.

In view of the service rendered and the economics involved, it is believed one more maintenance problem has been satisfactorily overcome.

HERE IS A COMPARISON BETWEEN THE STRAIGHT STACK AND A VENTRIX TYPE, BOTH JACKETED WITH ALUMINUM SHEET. STACKS OF NON-UNIFORM DIAMETER OR EMBODYING SOME OTHER CHANGE IN DESIGN, WHICH RESULTS IN VARIOUS SLOPING AND CURVED SURFACES, WILL HAVE HIGHER JACKETING COST.





THIS WESTINGHOUSE PANEL IS FOR A VARIABLE SPEED SYSTEM USING A MOTOR-GENERATOR SET TO SUPPLY D-C CURRENT TO THE VARIABLE SPEED MOTOR. IN UPPER CENTER MAY BE SEEN THE DISC-LIKE MOTOR DRIVEN RHEOSTAT WHICH CONTROLS ACCELERATION. ONLY ONE TUBE, A SMALL RECTIFIER TUBE, IS USED ON THE CIRCUIT.

## Electrical Variable Speed Drives

**T**HE electrical variable speed drive is universally based upon the use of a shunt wound direct current motor, now usually called a variable speed motor, the speed of which is varied by varying the voltage to the motor armature, the current to its field, or both.

There are two widely used methods of getting a variable direct current to the variable speed motor. One, and the one most commonly used for larger motors, is the use of a **direct current generator** connected with the variable speed motor through a control panel which contains rheostats for current regulation. The direct current generator is generally driven by an a-c motor directly connected to it by a flexible coupling.

The other method is to use an **electronic rectifier circuit**, which makes use of one or several rectifier tubes to apply direct current to the motor. These tubes may be controlled so as to vary the current input to the direct current motor.

### Know Equipment

There are, of course, infinite variations on the design and operation of the many types of speed controls available, and the most important job for the maintenance man, on the installation of an elec-

***The number one cause of maintenance headaches on this equipment is lack of design and operating information. Plant engineers and manufacturers can do much to remedy the situation.***

trical variable speed drive in his plant, is to get good wiring diagrams from the manufacturer and study them thoroughly.

This is not as easy as it may sound. In fact, most plant master mechanics, who will have charge of maintenance of these systems, are relatively unfamiliar with electric and electronic systems, and the manufacturers, on the other hand, seem to feel, from the type of jargon they produce under the name of wiring diagrams and instruction booklets, that all maintenance men are junior Edisons, who have been raised on Thyratrons and Amplidynes.

The best solution seems to be to have one of the installation engineers go over the physical layout and the wiring diagram, explaining the operation and purpose of each part. Do not let him get away with an explanation in which he acts as though he thinks you should understand, when actually you don't. Get him to explain it in your own language. Make him explain rectifiers in terms of check valves,

valves that will let the current go freely in one direction but will not let it reverse. Make him explain rheostats in the same terms—terms a mechanical man can understand.

Of course, if the plant engineer already knows all the answers—if he really is an electrician instead of a mechanic, most of this will be unnecessary, but there are some new tricks on some of these systems that will still need explaining to all except the designer of the equipment.

Full understanding of the design of the equipment has been emphasized, because it is the one thing that causes more maintenance headaches than all the others. Engineering representatives of the manufacturers are constantly complaining of how they have had to make two or three hundred mile trips to do little maintenance jobs that any child could have handled in five minutes. He has no one but himself to blame, for he had failed to see to it that the plant's maintenance man understands the machinery and the wiring diagrams.

There is an actual case of a representative of one of the large electrical manufacturers making an all day trip (at considerable cost to the customer) to blow a little bronze dust out of a motor driven rheostat.

A great many of these drives use motor driven rheostats to regulate the rate of acceleration of the main adjustable speed motor. As the contact arm turns back and forth, a small amount of bronze dust falls downward and accumulates on separated contact plates at the bottom. This shorts these contacts, and the motor accelerates in jerks and jumps instead of smoothly. Removing the cover from these rheostats and blowing them out with low pressure compressed air will eliminate this trouble. It should be done every two or three weeks.

The maintenance man in one plant decided to do a particularly good job and used high pressure compressed air for the job. He just about blew the rheostat apart and had to have the rotating arm and its mounting replaced. About 10-15 psi is right.

#### Spare Parts

On drives that use motor driven rheostats, the maintenance stock room should keep at least one full set of parts, including an extra small motor of the type used to drive the rheostat. These parts are not expensive and are easy to replace, but when anything does go wrong in the rheostat, the drive is through until it is fixed, so it is well worth the inventory cost to keep extra parts.

These drives can vary in type from that which uses merely a selenium power pack, a d-c generator, and no vacuum tubes, to the fully electronic type with all tubes and no generator. Most of the drives now in use are somewhere in between and use a generator and anywhere from one to fourteen tubes. Most of the type using just one tube have substituted metallic rectifiers for the tube in the newer designs, and these have a much longer service life. On the other hand, these one rectifier drives all use the motor driven rheostats, which are in themselves the cause of some maintenance work.

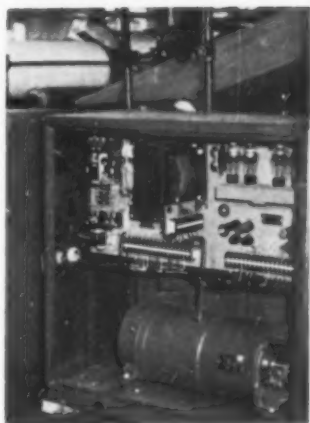
Wherever there are tubes used, spares should be kept on hand. In some plants it is the practice to replace the short-life tubes according to a regular schedule (once a year) rather than wait for the tube to actually burn out and cause a work stoppage.

#### Commutators and Brushes

The remaining maintenance on electric variable speed drives consists in keeping the motor generator and the adjustable speed motor in good running condition. Commutators should be inspected weekly to see that there is no excessive sparking and that the motor is running well in general. Brushes should be replaced from time to time, and occasionally the commutator should be ground or turned if it has worn out of roundness. There is nothing required, however, which is not good practice for all d-c motors or generators. Keep them clean; keep them well lubricated in accordance with the instructions for bearing lubrication as furnished by the manufacturer; and do not overload.

#### Switches

There is one other piece of connected equipment that sometimes requires attention. The switches, of which there may be more than a

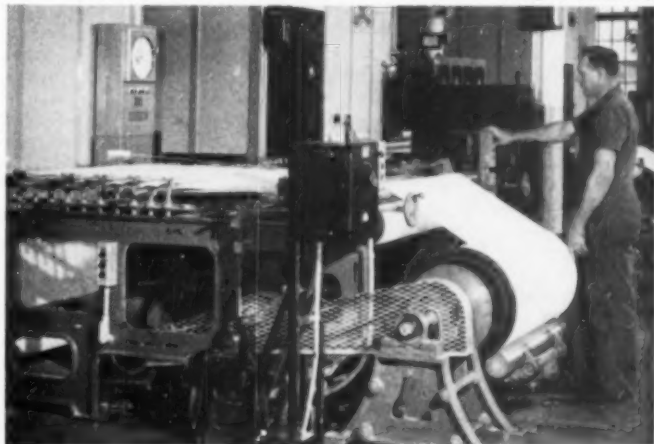


THIS CONTROL PANEL, WHICH ALSO CONTAINS THE MOTOR-GENERATOR SET, USES MORE TUBES BUT DOES NOT USE A MOTOR DRIVEN RHEOSTAT. ACCELERATION IS HANDLED BY ELECTRONIC CONTROLS.

dozen for each application, can fail to function when dirt, lint, or other foreign matter gets between the contacts. If the area in which the switches are located is lousy or dirty, dustproof switches may pay for themselves in reduced maintenance. If standard switches are used, they should be blown out every three to six months or as experience dictates.

A VARIABLE DRIVE INSTALLED ON A HOT AIR TEXTILE SLASHER. THIS DRIVE REGULATES THE SPEED OF SEVERAL MOTORS, ONE OF WHICH MAY BE SEEN BENEATH THE FRAME IN THE FOREGROUND. THE OPERATOR IS PUSHING ONE OF THE PUSH BUTTONS WHICH STARTS THE MOTORS. THE MANUAL RHEOSTAT IN THE FOREGROUND PROVIDES STEPLESS SPEED VARIATION ON THE "FAST" PUSH BUTTON.

Westinghouse Electric Corp.



# Purchasing for Maintenance

*A well organized purchasing procedure is essential to the smooth performance of every industrial plant maintenance program.*



**By Roy W. Pitts**

Purchasing Agent  
Atlantic Steel Company, Atlanta, Ga.

VERY little advancement had been made toward development of adequate materials procurement procedures prior to World War One. Up until that time the foreman or superintendent was held responsible for having the necessary materials for his particular department on hand at the right time.

The foreman or superintendent usually selected and purchased his requirements without sufficient attention to quality or whether a better product could be obtained at a lower price. And, unfortunately, they frequently insisted upon the same product being used year after year. This was not only a bad price policy, but it handicapped progress and prevented development and use of new and better products.

It was during World War One that management realized it was essential to have a centralized purchasing department to perform this important business function—a department responsible for having the correct material at the proper place at the required time without carrying an excessive inventory. The purchasing profession remained more or less dormant in most companies, however, from the end of the first war until the beginning of the past war. But as World War Two got under way wide awake management realized that demand exceeded supply, and materials immediately became critical or controlled by one or more of the various Government regu-

lations. Then purchasing really became a part of management. It immediately became the job of the purchasing department to coordinate the receipt of materials with production and sales, and to see that the proper flow of materials into the plant was obtained to take care of the increasing rate of production.

The purchasing department of Atlantic Steel Company is responsible for the procurement of all raw materials, maintenance supplies, and capital equipment. In all instances, we confer with the engineering department, as well as the superintendent of the department in which the capital equipment is to be used. When all concerned have agreed on the type and make of equipment, the engineers prepare an estimate as to the installation cost and a recommendation is made to management for approval of the purchase.

On operating and maintenance supplies, as well as raw materials for production, a purchase control record is kept in the purchasing department to assure an uninterrupted supply of materials at all times. Yet, at the same time, control is exercised to eliminate excessive inventories of any one commodity. This is accomplished by keeping a control card on operating and maintenance supplies

which enables us to have available at all times: cost information, inventory of all commodities, required delivery date, an efficient follow-up system, and a record of the minimum and maximum stock.

Some of the duties and problems of the purchasing department are enumerated in the following paragraphs:

(1) **Making contracts** involves constantly keeping abreast of market trends, supply, and demand, in order to purchase the proper quantity—always keeping in mind storage costs and deterioration. We all know that it is very important, when executing a contract, to scrutinize every clause, especially the fine print. A contract can be very simple, and yet cover the transaction adequately. In the event you are not familiar with the terminology written into the contract, find out the meaning before signing.

(2) **Actual buying**, in the majority of instances, poses the necessity of discussing various phases of the product or products with the vendors' representatives. Find out everything possible about the materials in question before making any commitments. A representative who is familiar with his products is glad to have the opportunity to furnish any information that you may desire. Beware of the "high pressure" type—the man



who insists upon getting your name on the dotted line for an excessive quantity.

(3) **The best supply source** should be maintained by a continuous search for comparable products at a lower delivered price, or consideration of another material that will do the job better. Be progressive, but use common "horse sense" in selecting and trying new items. Keep abreast with new methods, developments, and practices.

(4) **Standardization** is something that we have been endeavoring to accomplish at our plant for several years. It is very difficult however, and while we are definitely making progress, there is still room for much more improvement. But with the continued cooperation of our operating department we will certainly be able to lower the number of stock items necessary to operate our plant.

(5) **Transportation cost** plays an important part in the final cost of the delivered product, and in order to get our purchased items in our plant at the lowest possible price, we work very closely with our traffic department. Recently, in a twelve month period, we effected a saving of over \$50,000 in freight charges on one product by changing point of shipment. Similar savings have been made on many other

items which we obtain in the Southeastern states.

(6) **Purchasing methods** are subject to continuous change and improvement. It is obvious that no plant, and ours is certainly no exception, could hope to be successful without the cooperation of the operating department with management, and it is just as necessary for the engineering and purchasing departments to work with each other. In fact, these departments should work almost as a single unit. Each department, with knowledge of their respective duties can make an important contribution to the success of the company.

In our opinion, regardless of the size of a company, it is necessary to have a projected (planned well in advance) repair and replacement program. Knowing and planning in advance the repairs to be made at a specified date eliminates unnecessary production loss, and allows the material or parts to be on hand to complete the job as scheduled. This is accomplished by the cooperation of our engineering department in planning and requisitioning the materials required to do the job early enough to allow the purchasing department to secure the required parts and materials in ample time to prevent a costly delay.

No article on purchasing would be complete without mentioning **safety**, and I want to emphasize the part we believe our department plays in promoting safety for the employees at our plant. Purchasing for safety involves many things other than merely placing orders for equipment and materials. First, a workman's wholehearted support of the safety program must be secured. This is not always easily done, for every now and then an employee engaged in work turns out to be an unwilling recipient of safe working conditions.

Through our accident prevention committee new methods are being developed daily to insure a workman in our mill against almost any hazard. All of these safety measures call for equipment which, in many instances, requires special manufacture. These purchases are made with even more care and consideration than the buying of materials going into the manufacture of steel and of the machinery necessary for making. It is realized that without proper safety equipment we run the risk of encountering costly accidents.

The average workman has little knowledge, if any, of the many different articles that have to be pur-

(Continue on page 137)

AIR  
VIEW  
ATLANTIC  
STEEL  
COMPANY  
ATLANTA  
GEORGIA



**T**HE plant, now known as the Atlantic Steel Company, was organized in 1901 and started operation under the name of Atlanta Steel Hoop Company—rolling small strip on an 8-in. mill driven by small steam engines. At the beginning, the billets were purchased from Birmingham and reduced to strips and shipped to other companies for fabrication into finished product.

In 1905, the management decided to build two open hearth furnaces and install a blooming mill

in which ingots could be rolled into billets. After a short time it was found that the furnaces produced more steel than could be processed in the small 8-in. mill, so a combination rod and bar mill, and a wire mill, were built to absorb the surplus.

The mill has grown steadily through the years until today it has three 72-ton basic open hearth furnaces producing approximately 180,000 tons of ingots annually. The plant now produces various finished products and employs over 2,000 workers.



View of enclosed a-c magnetic switch.



Dust-tight magnetic switch enclosure.



Water-tight enclosed magnetic switch.



Enclosure for hazardous gas locations.

CORRECT CHOICE OF ENCLOSURE REDUCES SWITCH MAINTENANCE

# How to Maintain INDUSTRIAL CONTROLS —

## —PART 1—INSPECTION SCHEDULES—

***This Part 1 of a 3-article series on maintenance of controls covers Inspection Schedules. Part 2 will deal with Tools and Procedures, and Part 3 will discuss Trouble Shooting.***

By  
**W. P. Patrick**

Control Division  
General Electric Co.  
Schenectady, N. Y.

**I**N these days of high machinery cost an effective preventive maintenance program pays substantial dividends. These dividends can be in the form of less down time due to the failure of some piece of equipment or by preventing the complete replacement of some component which might otherwise be permitted to operate to a point of destruction. Industrial control equipment, although designed to perform many millions of operations, does incorporate parts which are subject to wear. The useful life of any control device can be increased, therefore, by a good protective maintenance program, which sets up periodic inspections to check the wearing parts so that replacement can be made before permanent damage or complete failure occurs.

Two basic types of failures can occur: (1) an electrical failure caused by loose connections, poor contact, welding or freezing of contacts, operating coil failures, insulation failures, open circuits, shorts or electronic tube failures, (2) mechanical failures caused by broken or worn linkages, mechanical bindings, malfunctioning of relays due to linkages being jarred out of their bearing surfaces as a result of abuse or shock.

### Enclosures

Unusual operating conditions, such as dusty, moist, or corrosive atmospheres may serve to accelerate wear and failure unless suitable protection is provided, by special construction or finishes. Special construction might include suitable enclosures. Some typical

enclosures are shown in the accompanying illustrations.

### Renewal Parts

The maintenance program will be most successful when a stock of renewal parts is kept on hand for emergencies. Most control manufacturers can assist with this portion of the program by supplying complete renewal parts lists which are available for standard devices and at the same time will recommend on request the principal parts which they feel should be kept on hand as spares.

### Inspection

The success of any maintenance program is completely dependent upon regular inspection. This program will be most effective if it is carried out by personnel who are

**Table 1—Inspection Schedule**  
**Industrial Manual and Magnetic Control**

Inspection Period	What to Inspect	What to Inspect For
MONTHLY	<p align="center"><b>MAGNET-OPERATED DEVICES</b></p> <p>Contactors, Relays, Solenoids, AC and DC Brakes</p>	<ul style="list-style-type: none"> <li>• Control-circuit voltage.</li> <li>• Collections of dirt or gum.</li> <li>• Excess heating of parts—evidenced by discoloration of metal parts, charred insulation, or odor.</li> <li>• Freedom of moving parts (no binding or sticking).</li> <li>• Corrosion of metal parts.</li> <li>• Remaining wear allowance on contacts.</li> <li>• Excess slam on pickup.</li> <li>• Proper contact pressure.</li> <li>• Loose connections.</li> <li>• Condition of flexible shunts.</li> <li>• Condition of arc chutes or barriers.</li> <li>• Worn or broken mechanical parts.</li> <li>• Excessive arcing in opening circuits.</li> <li>• Condition and level of oil (if oil-immersed). Check for presence of sludge.</li> <li>• Condition of gaskets (for oil-immersed, dust-tight or water-tight units).</li> <li>• Excessive noise in a-c magnets.</li> <li>• Evidence of dripping water or liquids falling on control.</li> <li>• Operation—including proper functioning of timing devices, sequencing of devices, etc.</li> <li>• Condition of wheels and linings (this applies to brakes only).</li> </ul>
MONTHLY	<p align="center"><b>THERMALLY-OPERATED DEVICES</b></p> <p>Overload Relays, Temperature Relays, Thermostats, etc.</p>	<ul style="list-style-type: none"> <li>• Collection of dirt or gum.</li> <li>• Excess heating of parts—evidenced by discoloration of metal parts, charred insulation, or odor.</li> <li>• Freedom of moving parts (no binding or sticking).</li> <li>• Corrosion of metal parts.</li> <li>• Proper contact pressure.</li> <li>• Loose connections.</li> <li>• Condition of flexible shunts.</li> <li>• Worn or broken mechanical parts.</li> <li>• Excessive arcing in opening circuits. Evidence of dripping water or liquids falling on control.</li> <li>• Condition of heating element.</li> <li>• Condition of control-circuit contacts.</li> <li>• See that contacts open when latching mechanism trips.</li> </ul>
MONTHLY	<p align="center"><b>MOTOR-OPERATED DEVICES</b></p> <p>Motor-operated Timers, Thrustors, Valves, Brakes, Rheostats</p>	<ul style="list-style-type: none"> <li>• Control-circuit voltage.</li> <li>• Collections of dirt or gum.</li> <li>• Excess heating of parts—evidenced by discoloration of metal parts, charred insulation, or odor.</li> <li>• Freedom of moving parts (no binding or sticking).</li> <li>• Corrosion of metal parts.</li> <li>• Proper contact pressure.</li> <li>• Loose connections.</li> <li>• Condition of flexible shunts.</li> <li>• Worn or broken mechanical parts.</li> <li>• Excessive arcing in opening circuit.</li> <li>• Condition and level of oil (if oil-immersed). Check for presence of sludge.</li> <li>• Condition of gaskets (for oil-immersed, dust-tight or water-tight units).</li> <li>• Evidence of dripping water or liquids falling on control.</li> <li>• Operation—including proper functioning of timing devices, sequencing of devices, etc.</li> <li>• Excess vibration or noise in operation.</li> <li>• Wear or roughness on sliding contacts.</li> <li>• Condition of gearing, lubricate where recommended.</li> </ul>

Inspection Period	What to Inspect	What to Inspect For
SEMI-ANNUALLY	<b>STATIC ACCESSORIES</b> Resistors, Rectifiers, Capacitors, Transformers, Fuses, Wiring, Bus and Cable Work	<ul style="list-style-type: none"> <li>• Collections of dirt or gum.</li> <li>• Excess heating of parts—evidenced by discoloration of metal parts, charred insulation, or odor.</li> <li>• Corrosion of metal parts.</li> <li>• Loose connections.</li> </ul>
SEMI-ANNUALLY	<b>MECHANICALLY-OPERATED DEVICES</b> Master Switches, Drum Controllers, Push Buttons, Selector Switches, Knife Switches, Manual Starters, Rheostats, Limit Switches, Speed-sensitive Switches, Flow Switches, Float Switches, Pressure Switches	<ul style="list-style-type: none"> <li>• Collections of dirt or gum.</li> <li>• Excessive heating of parts—evidenced by discoloration of metal parts, charred insulation, or odor.</li> <li>• Freedom of moving parts (no binding or sticking).</li> <li>• Corrosion of metal parts.</li> <li>• Remaining wear allowance on contacts.</li> <li>• Proper contact pressure.</li> <li>• Loose connections.</li> <li>• Condition of flexible shunts.</li> <li>• Condition of arc chutes or barriers.</li> <li>• Worn or broken mechanical parts.</li> <li>• Excessive arcing in opening circuits.</li> <li>• Condition and level of oil (if oil-immersed). Check for presence of sludge.</li> <li>• Condition of gaskets (for oil-immersed, dust-tight or water-tight units).</li> <li>• Evidence of dripping water or of liquids falling on control.</li> <li>• Condition of control-circuit contacts.</li> <li>• Wear or roughness on sliding contacts.</li> <li>• Lubricate contacts where recommended.</li> </ul>
SEMI-ANNUALLY	Arc Chutes or Barriers	<ul style="list-style-type: none"> <li>• If they are almost burned through, replace. This will prevent the heat from the arc burning out the pole pieces or shorting to the next phase.</li> </ul>
SEMI-ANNUALLY	Flexible Shunts	<ul style="list-style-type: none"> <li>• Corrosion</li> <li>• Damage from wear.</li> <li>• Flex or twist slightly to make sure that they are in good condition.</li> </ul>
SEMI-ANNUALLY	Interlocks	<ul style="list-style-type: none"> <li>• Be sure they are adjusted as described in the manufacturers instruction book.</li> </ul>
SEMI-ANNUALLY	Push Button Stations, Overload Relay, Contacts, Etc.	<ul style="list-style-type: none"> <li>• Be sure they function freely enough to provide protection if an emergency arises.</li> </ul>
SEMI-ANNUALLY	Gaskets	<ul style="list-style-type: none"> <li>• Corrosion.</li> <li>• Torn or damaged so that they do not make tight joints.</li> </ul>

**Table 2—Inspection Schedule  
Industrial Electronic Control**

Inspection Period	What to Inspect	What to Inspect For
EVERY 3000 HOURS	Electronic Tubes	<ul style="list-style-type: none"> <li>• In order to maintain continuity of service, all electronic tubes should be tested and replaced if found deficient.</li> </ul>
1 TO 3 MONTHS depending on frequency of operation	Contacts of Magnetic Relays or other Magnetic Devices	<ul style="list-style-type: none"> <li>• Excessive wear, burning or pitting. Replace contacts where necessary.</li> <li>• Amount of wipe on normally closed contacts of sensitive relays.</li> </ul>

Inspection Period	What to Inspect	What to Inspect For
1 TO 6 MONTHS	Electronic Relays. Probes. Electrodes, and Initiating Devices used with Electronic Relays. Electronic Timing Relays. Auxiliary Electrical Devices. Connections.	<ul style="list-style-type: none"> <li>• Presence of dirt, metallic dust, and other foreign material. Because of high impedance of most electronic circuits, such accumulations may cause trouble.</li> <li>• The presence of moisture will make conditions much worse. Particular attention should be paid to probes and electrodes used with electronic relays.</li> <li>• Leakage resistance of wiring, cables and panel surfaces should be in excess of several hundred megohms.</li> </ul>
3 TO 6 MONTHS	Connection of Two Terminals and Plug Connection.	<ul style="list-style-type: none"> <li>• Under conditions of vibration, these connections may come loose. Tighten securely.</li> </ul>
3 TO 6 MONTHS	Auxiliary Electrical Devices	<ul style="list-style-type: none"> <li>• Contact wear, loose parts, proper lubrication, etc.</li> </ul>

familiar with the equipment being serviced and understand its operation. Most manufacturers of control equipment supply instruction books with standard line equipment and devices which serve as useful guides towards understanding the apparatus. This information is usually supplemented by

detailed connection diagrams which, if read carefully, will contribute to the operator's understanding.

#### Inspection Schedules

To help in the establishment of an inspection routine, a suggested schedule follows. This schedule is

based on average conditions, therefore the frequency should be adjusted for each application as dictated by experience. For convenience this chart is sub-divided into two groups: Table 1—Industrial Manual and Magnetic Control, and Table 2 — Industrial Electronic Control.

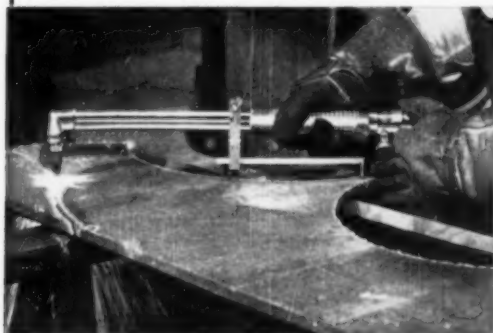
*Part 2 in the June issue will discuss tools and procedures for maintenance of controls*

### Compass-Clamp Makes Circle Cutting Easy

WITH an oxy-acetylene hand torch it is often difficult for even the most experienced operator to cut clean, accurate circles in heavy steel plate. But with the simple compass attachment devised by millwright Milton Harnack of Allis-Chalmers Mfg. Co., the job becomes relatively easy.

The attachment consists of an adjustable sliding bar held by a screw to a quick opening

clamp which is fastened to the torch by a wing nut. In one position, as shown, the compass-clamp is arranged to cut circles up to about 18" diameter. By reversing the clamp, larger circles up to 36" diameter may be produced. Centers of circles are located from a sharpened point at one end of the sliding bar. By placing the point in a center punch mark, the compass is readily held for cutting and will not slip.





# Flexible Power System for Roanoke Mills Company

By R. J. Tucker, Jr.

Plant Engineer  
Roanoke Mills Company  
Roanoke Rapids, N. C.

*The entire electrical distribution system  
for this plant was modernized with  
minimum interruptions to production.*

THE management of Roanoke Mills Company, Roanoke Rapids, N. C., was faced with a serious power distribution problem at its No. 2 mill. The main mill building housing the pickers, cards, drawing, slubbers, intermediates, spinning, twistors, warpers, spoolers and winders needed a new roof. In addition the electric power system serving the building was obsolete and overloaded. The majority of

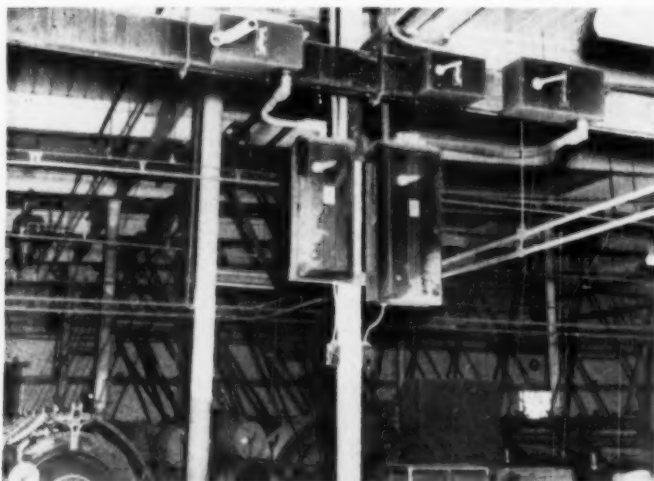
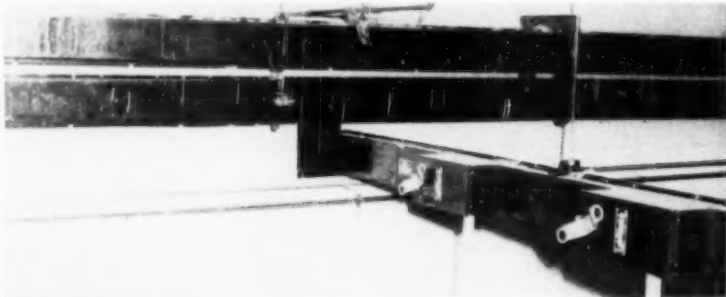
the machines were group driven from motors and electrical feeders on the ceiling. Thus the new roof sounded the death toll for the power system and the drives if plant production was to be maintained.

Indeed this problem came to a head none too soon. The power system serving the building was that installed in 1918. Power was transformed from 6600 to 220 volts in

an indoor vault. The vault housed three 333 kva indoor power transformers oil cooled, a high voltage oil circuit breaker protecting the transformers, and a live front switchboard made up of four three pole knife switches on an ebony asbestos panel with 600 amp fuses behind each switch for feeder protection. Also in the vault was a 100 kva lighting transformer with fused cutouts and an open 6600 bus

THE VIEW AT RIGHT SHOWS THE LOCATION OF THE BUS SECTIONALIZATION POINTS. THE BUS RUN SUPPLYING SPINNING FRAMES CAN BE CONNECTED TO EITHER TRANSFORMER BANK DEPENDING UPON LOCATION OF THE BUS SECTIONALIZING INSULATORS.

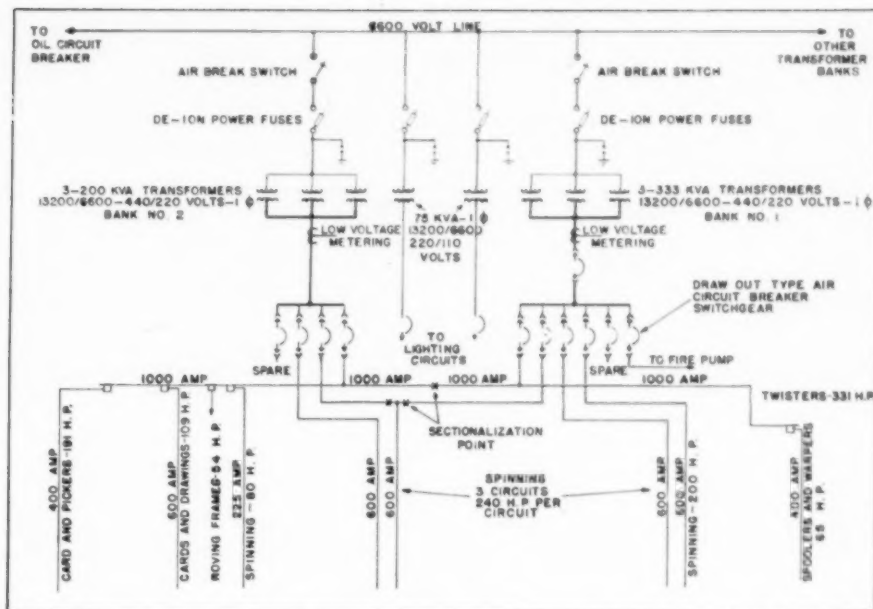
A TYPICAL INSTALLATION OF MOTOR STARTERS IS SHOWN BELOW. NOTE EASE OF CONNECTION TO BUS DUCT SYSTEM.



for connection to the various transformers. The whole vault was quite crowded and dangerous.

Feeders from the vault were 220 volts, 3 phase, 60 cycles, consisting of three single conductors of slow burning type insulation ranging in size up to 750 mcm. These feeders were run along the ceiling in a wooden recess in the roof decking just above and crossing the roof beams. Soldered taps fed open fuse blocks mounted upside down on the bottom face of the wooden beams. The fuses fed motor starters mounted against the side of the beams, the whole being about 15 ft above the floor. It is readily seen that the new roof eliminated further use of this wiring system.

The mill management quickly



ONE LINE DIAGRAM OF NEW DISTRIBUTION SYSTEM SHOWING MAJOR ITEMS OF EQUIPMENT.

recognized the situation and set aside funds for modernization of the power system. The accompanying diagram shows clearly the new system installed.

#### Plant Substation

The original transformers, high voltage breaker and switchboard were discarded. New transformers and high voltage equipment were located outdoors, clearing the old vault to house modern switchgear. Additional transformer capacity was provided by construction of a new switchroom and transformer bank so located as to divide the electrical load according to the "load center" system of power distribution. New transformers are Westinghouse type SL, oil insulated self cooled, 333 kva single phase, 13,200/6600-440/220 volts. Switchgear is Westinghouse metal clad using draw-out type air circuit breakers of 50,000 amps interrupting capacity for each feeder.

#### Distribution System

Of particular interest and importance was the power distribution feeder system. After considerable investigation a three phase plug-in bus duct system manufactured by

the Bulldog Electric Products Company was selected rather than conventional cable and conduit. The accompanying diagram shows the actual layout and details. During the roof construction period the 1000 amp bus running along the west wall was the mainstay of the system. Power is taken off at any point along its length to suit requirements.

The old open wire feeders were used as long as possible under the roof sections awaiting repairs. Machinery under the new roof was connected to new individual drives with power supplied from the new bus duct system. Construction began at the south end of the building and progressed slowly to the north. As it moved more of the old wiring was discontinued and the new system put in service.

#### Sectionalizing

Two features of the system have proven particularly valuable to us. On the plan are shown two circuits through which the transformer banks can be connected together. Should either bank give trouble it is a simple matter to transfer its load to the other. This is done by simply removing three sectionaliz-

ing insulator inserts at the points indicated and connecting the bus runs together. No reduction in load is necessary unless an entire bank is lost. Even then a continuous flow of production throughout the building is insured at a reduced rate. We have already made use of these interconnections on one occasion. The money saved in this one case, a transformer failure, more than paid for the bus duct necessary to provide the interconnections.

#### Bus Duct Feeders

The other feature is the unusual manner of connecting power to the spinning frames. Normally under-floor conduits are employed. On the first floor of a building with no basement this is very expensive and becomes more so each time the frames are relocated. This expense is eliminated by suspending bus duct feeders directly above the individual motor starters on each frame. Clearance, of course, must be provided for overhead cleaners on the frames. The spinning frames can be relocated at any time with practically the only wiring expense being the labor to relocate the bus duct, whereas when using underfloor conduits and wiring

these materials are almost always scrapped.

#### Other Advantages

Our experience with the bus duct system reveals many tangible advantages over the conventional cable in conduit. The duct is very easy to install and use. It is never necessary to kill a circuit in order to make new connections to it. We find the installation time required to be about one-fourth or less of that required for heavy cable in conduit. While in most cases it is necessary to purchase some special length of duct in order to locate it in the exact position desired, we find this to be no disadvantage. Alterations in length of several inches can frequently be made right on the job.

A primary advantage of bus duct is its 100% reinstallation value. We relocated several machines after our system had been engineered

and these machines were very easily provided for by simply relocating certain duct runs. We know that at any time in the future we can completely relocate any machinery in the building affected and at the same time relocate any bus duct necessary to accommodate the machinery. The principal expense in such a case is labor. Wholesale discarding of wire and conduit for new circuits is eliminated.

The voltage distribution throughout the building has been excellent. No longer do we have the customary worries accompanying a heavy cable installation such as twisted cable, insulation cut at junction boxes, loose connectors or insulation deteriorated from age, overheating and vibration. We must admit that the average bus duct installation detracts somewhat from the overall building appearance as it is not practical to conceal it un-

der floors or against flat surfaces normally used for conduit runs. We feel this factor is considerably outweighed, however, by the many advantages of bus duct.

Engineering for the system was done by the plant engineer and R. T. Howell, master mechanic, in cooperation with representatives of Westinghouse Electric Corporation and Bulldog Electric Products Company. Motors, bases, starters and miscellaneous equipment for the individual motor drives were supplied by the Electric Motor Repair Company, Raleigh, N. C.

Some portions of the system have been in use for over two years now and we are highly pleased with its performance.

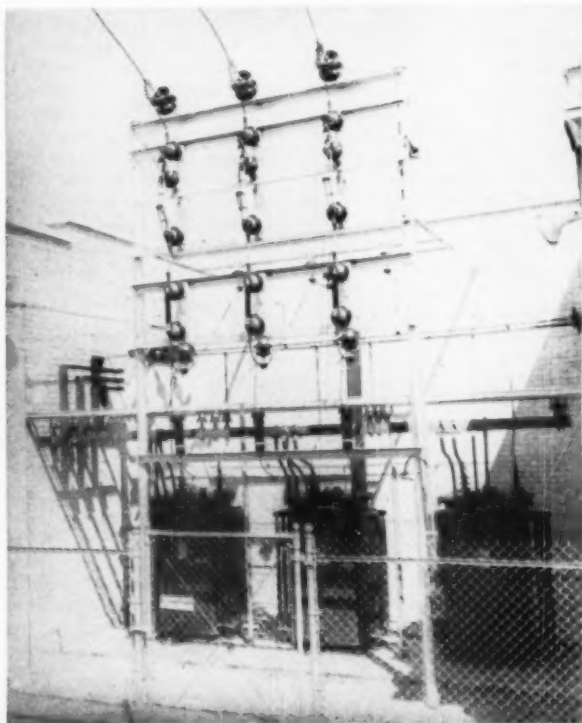
#### Checking Elevator Contactors

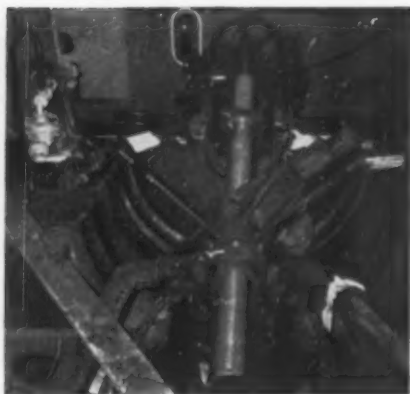
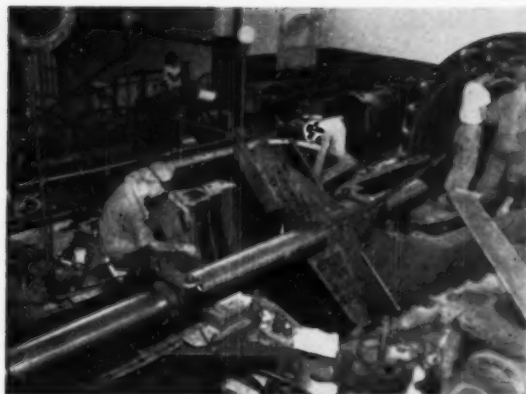
THE control board of a push-button controlled elevator has magnetic contactors, the moving parts of which are connected to terminals on the board by flexible copper straps. These straps are flexed many times in a day; and in course of months of service may break. One did break on a three-phase machine. Somebody pushed a button to start the elevator. The contactor closed, but the motor, being connected single phase, did not start. The thermal cutout for some unknown reason failed to work. Since the elevator did not move, and the floor selector did not turn, the contactor remained closed until some one saw smoke coming from the machine room and opened the line switch. The motor had to be rewound and the elevator was out of service for three days.

That will not happen again to an elevator at this plant. Each day as the maintenance man makes his round, he hooks a finger in each flexible copper strap and gives it a jerk. If it has about reached the breaking point, it breaks then and is replaced with a new one. The same procedure may save trouble on any control board that has accessible conducting straps. As a safety precaution, the maintenance man should open the line switch before he yanks on the straps.

JAMES B. STEWART (TENN.)

VIEW OF NO. 1 TRANSFORMER BANK.





THE VIEW AT LEFT SHOWS THE TOOL SHAFT IN POSITION AFTER THE FITTED SURFACES WERE MACHINED DOWN. LEFT, LOOKING ALONG THE BORING TOOL SHAFT. THE "HORNS" PROTRUDING JUST BEHIND BEARING IN FOREGROUND ARE PART OF THE "STEADY-REST".

## A Turbine Repair Tool That Works

**Normally "store-bought" tools are better than "home-made", but here is a case where skilled home talent paid off.**

**By Carl B. Moore**

Engineer  
Florida Power & Light Company  
Miami, Florida

**A**BOUT as far south as you can go in this country and still find electric generating plants, Florida Power & Light Company with head offices in Miami, Florida, has come up with a comparatively inexpensive tool for machining interior surfaces of its large steam turbines.

In some of its main plants, turbo-generators have been grinding out kilowatts for more than twenty years, practically without let-up except for short scheduled overhaul periods. It was not unreasonable to expect nor surprising to find steam leakage around the outer rim of the turbine diaphragms after so many years operation. This, of course, is no uncommon occurrence and all turbine maintenance men are familiar with the gradual erosion of diaphragm supporting ledges to the point of impairing efficiency of the turbine.

Florida Power & Light Company's turbo-generators are maintained in top running order by scheduling outages for overhaul at propitious intervals. Worn parts

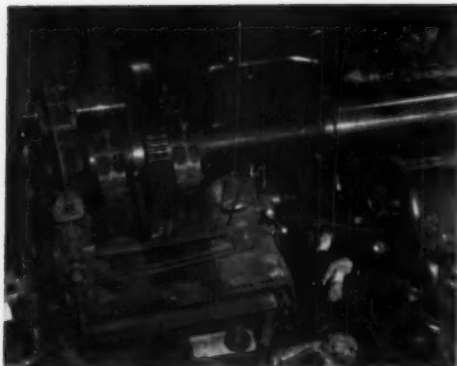
are replaced and repairs made to accessible portions of the machine at such times, but major jobs like restoring ledge surfaces are not undertaken until it becomes an absolute necessity. But records kept of visual inspections and economics of operation gave warning last year that the time was near at hand when this major work must be done in some of the older units if the machines were to continue their reliable and efficient operation.

Facing this necessity was not alarming but the cost involved in getting available equipment to do the work was somewhat disturbing. Special facilities are required to handle the bulky and heavy work. Transportation costs alone on such equipment would support an average family for a year. Rental costs are in the order of \$450 for the first week and \$150 for each succeeding week, and normal usage may be expected to consume about four weeks. Besides this, a factory operator and his helper must be engaged to operate

the rented machine and their wages and expenses are added to the bill. When estimated costs were totaled it was found that somewhere near \$6000 would be needed for just one turbine repair job, not counting plant personnel payroll and other factors entering into any such maintenance project.

Mulling the problem over, J. W. Keck, superintendent of generating stations, envisioned an apparatus to perform the work, made a few sketches and worked out enough details to prove the idea practical. Having competent men available in the organization, the design, construction and operation of the apparatus could be accomplished and servicing of turbines performed without resorting to rental and all its attendant headaches.

Turbo-generators of 10,000 kw capacity and larger are big things. You don't dismantle them and take the casings over to a lathe to machine their surfaces, so the lathe must be brought to the turbine. Apparatus needed for the work under discussion was a boring tool



THE POWER DRIVING UNIT OF THE BORING TOOL WAS DESIGNED IN THE GENERAL ENGINEERING DEPARTMENT. STANDING IN THE SMALL END OF THE TURBINE LOOKING OVER THE BORING TOOL CUTTING ARM ARE H. L. BROWN, HELPER, ON THE LEFT, AND L. H. BIELER, MECHANIC, ON THE RIGHT. H. F. BURDETT, CHIEF MACHINIST AND SUPERVISOR, PEERS INTO THE CASING UNDER FIRST STAGE NOZZLES.

small enough to be set up at the turbine and at the same time large enough to do the heavy machining work required inside the casing. The "hole" to be bored may be as large as 10 feet in diameter and that makes it obvious that sturdy tool arms must be provided to cut metal smoothly at a five foot leverage.

#### Engineers Step In

At this point, services of company engineers under E. F. Johnson, chief engineer, were requested, to complete the design and make shop drawings so that the boring tool could be built. Compactness was essential, as also was its adaptability to the various sizes

of turbines on which it would work. Tool tip speed was determined to be a minimum of 35 fpm, but variable for the different metals used in the relining process, up to an anticipated maximum speed of around 100 fpm. This meant a reduction from the motor driving speed to a tool shaft speed of 1 rpm and variable but not limited to a maximum of 3 rpm.

Loading and deflection calculations determined suitability of a hollow steel tool shaft 10" o.d. and 7½" i.d., allowing a maximum working stress of 18,000 psi. Dimensions of the tool arm were developed so as to minimize chattering. Speed reduction and compactness were accomplished through

judicial arrangement of pulleys, spur gears and standard reduction gear units—stepping down from the 3 hp electric motor speed of 1800 rpm. Variable speed is obtained from a regular automobile transmission gear box. The "business" end of the tool where boring takes place inside the turbine casing is a counterbalanced arm of adjustable length, made of cast iron, tapering towards its ends, channel shaped in section, and adapted for a standard Martindale commutator grinding tool for micrometric radial and cross feeds. A unique "steady-rest" that can be set up close to the cutting arm insures further against shaft deflection and "out of round" boring.

THE BORING TOOL IS SEEN IN ACTION, MACHINING THE LEDGE BETWEEN 5TH AND 6TH STAGE DIAPHRAGMS. THE CLOSE-UP AT RIGHT SHOWS THE CUTTING TOOL. WELDED LEDGE READY FOR MACHINING ARE EVIDENT AT LEFT OF TOOL. CHALK MARKINGS WERE MADE BY MACHINISTS WHEN TRUEING UP SHAFT.





Completed blueprints were turned over to company machinists in one of its steam electric station machine shops. Being well equipped to handle work of this nature and having capable men thoroughly conversant with objectives to be attained, the finished product was quickly and skillfully produced.

#### Operating Skill Important

Using the boring tool is the real important part, as a machine of this type can be only as good as the human element involved. To set up a 10-in. shaft 16 ft long in an open cylinder 10 ft in diameter is no small accomplishment when it has to be absolutely perfect and "cut and dry" adjustments are the only methods to use. Once perfect alignment is attained, the position can be dowelled for any future servicing. The company was fortunate in securing the services of Mr. H. F. Burdett, now retired, who is a specialist with country-wide experience in such work. Assisting in this difficult maintenance work, eventually to assume full responsibility, are members of the company's power department maintenance force, all qualified expert welders and machinists.

#### Steam Does Damage

Turbine diaphragms are set in the casing on "crush pins" with the back of their outer rims against diaphragm supporting ledges in which the turbine wheel spins. The fit between diaphragm rim and inner face of the ledge is the seal that prevents steam leakage around the diaphragm. Eventually, steam may find a minute passage through this seal and erosion of the ledge has its inception. The more moisture content there is in the steam, the more rapid is the erosive process. So, as would be expected, worst conditions are found in the lower pressure stages of the turbines where steam is no longer superheated, having expanded after giving up some of its energy in the higher pressure stages. Also, in these latter stages, contact surfaces are greater and present more possibilities for steam leakage. When erosion has progressed to the point of impairing efficiency and economy, the boring tool is called

into action.

Surfaces must be first machined down to remove pitting, plus an over depth for tolerance. The ledge perimeter is then built back up by welding in a nickel alloy known to the welders as "Ni-rod". Precautions have to be taken to eliminate voids in the welded-in metal when the refacing finish cut is taken, otherwise focal points for future erosion are established. The over depth in the original cut is to avoid hard spots and unevenness that would result should the finish cut penetrate at some point into the parent metal. Particularly ticklish, is the necessity in some instances of undercutting or "hollow grinding" at the base of the ledge, for clearance in fitting in the diaphragm. This kind of work cannot be done hurriedly because there is no patching up a poorly done job.

#### Performance Proven

The first maintenance job tackled with the boring tool was in May, 1949, on one of the 25,000 kw capacity units in Florida Power & Light Company's Lauderdale Steam Electric Station near Ft. Lauderdale, Florida. This unit had been in service for 23 years in a station operating as a base load

plant. Engineers of the turbo-generator manufacturer followed the work closely and were in accord with the opinion that as good results were obtained as could have been expected by factory service men using factory built equipment.

Another satisfying result was that the home-built machine paid for itself on its first job with a margin for profit, when compared with costs of renting. \$3600 covered all expenses in producing the boring tool, including engineering and overhead costs.

A second similar job was performed in October, 1949, on an equally old 15,000 kw capacity unit in the Miami Steam Electric Station. Results obtained in this job were as gratifying as in the first one. The accompanying photos show various phases of the work on this unit.

This year it is planned to make similar repairs on a second of the three 25,000 kw capacity units in the Lauderdale Steam Electric Station. After that, the boring tool will stand ready for use at any time and location in the company's system where needed. Since its application to refacing turbine ledges of the first turbine, use of the boring tool, as Mr. Keck sees it, has been "for free".

#### Power for Alabama Pulp and Paper

Two, duplicate Westinghouse 5000 kw, 80 per cent pf, 2300 v, 3-phase, 60-cycle turbo-generators supply power for the ALABAMA PULP AND PAPER MILL at Pensacola, Florida.

Surface condensers of 4000 sq ft capacity equal to 75 per cent of turbine rating are used with each machine. Steam is supplied at 400 psi and 650 F total temperature with single extraction at 50 psi.





N. N. Dannenbaum



H. J. Eastman



T. H. Felds



Lloyd Gregory



Geo. E. Gude

### Officers and Executive Committee — Houston Industrial Exposition

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M. E. Walter  
Houston Chronicle  
H. J. Voakum  
Gulf Tractor & Equipment Co.  
Ed. G. Lenzner  
General Manager  
J. Stewart Rhoades  
Assistant Manager

will be demonstrated by the **L. R. Ward Co.**, which will also display Powerstats, voltage regulators and electrical heating equipment.

A new air-operated, strip chart recorder known as the **Wheelco Pneumatic Capacilog** which measures temperatures, speed, flow, pressure static strain loads, voltage, amperage, etc., will be shown.

#### Pipe and Fittings

Among the insulating material will be **PC Foamglas** industrial insulation which is a cellular glass material used for pipe lines and processing equipment and which is waterproof, fireproof and acid-proof.

Cutaway or working models of

such items as **Barco** ball joints, **Briggs** filters, **Hammeldahl** valves, **Republic** flow meters, **Thomas** couplings and **Yarway** traps and strainers will be displayed by **M. N. Dannenbaum Company**. Devices such as the **Band-It** clamp for all kinds of pipe and for holding insulation on tanks, pipes, towers, etc. will be shown by **Ross K. Reed**. A glass model will show how the **Armstrong** trap handles condensate as well as air and dirt. The **Armstrong Machine Works** will also display a sectional model of their automatic gas purger for refrigerating systems. Unions of all kinds will be exhibited by **Yale Machine Works**.

A complete miniature automatic

sprinkler system will be operated throughout the show by the **Texas Automatic Sprinkler Company**. This system is set into operation by applying heat to a heat-actuated device connected to a dry pipe valve by copper tubing.

#### The Oil Industry

Among the many new refinery developments to be displayed is a new application of the **%Proportioners, Inc.** tetra ethyl lead blender. Also to be shown is that company's lube oil blenders, four of which are being installed at the present time.

A scale model of a complete offshore drilling set-up will be displayed by **Avondale Marine Ways**.



Chas. H. Lane



Ed. G. Lenzner



Frank K. Meyer



George O'Leary



J. S. Plowden

**Inc.** This will show auxiliary barge equipment and small boat transportation as well as the drilling assembly.

#### General Industrial

Engines, pumps, compressors and turbines will constitute an important part of the exposition. Among those items to be shown are products of the **Murray Iron Works**, and various items of the **Briggs-Weaver Machinery Co.** and of **Stewart & Stevenson Services**. Many of these are products of such well-known manufacturers as General Motors, Worthington, etc. Specific parts, such as the Repsco Rotary Shaft Seal will be shown. Some equipment representatives, such as Rowan and Buchanan will exhibit numerous products and this company will have on display pumps, chemical functional units and similar items in addition to conveyor systems and towers.

Specialized equipment for particular industries will be also exhibited. **The Jeffrey Manufacturing Co.**, for example, will show sewage treating equipment, vibrating feeders, shredders, pulverizers and other similar products.

Particular emphasis will be placed by the **Bettis Corp.** on its new steam generators that range in size from 15 hp up to 300 hp for drilling rig boilers.

Welding equipment, with its wide industrial use, will be displayed by **Hobart Brothers** and will include auxiliary equipment for arc welding as well as machines and electrodes. This exhibit will be operating and competent welding experts will be on hand to discuss welding problems and offer advice and recommendations. Equipment for inert gas welding

will be shown and demonstrations of its use will be given.

Chains for various purposes, both for equipment power and conveyor operation will be exhibited by the **Whitney Chain Co.** which will also display sprockets, keys and couplings.

#### Auxiliary Equipment

Tools that aid in cutting down cost, increase safety and improving production will be shown. Among such tools will be the newly designed Roll-In metal cutting band saw which has a gravity feed that insures a constant blade pressure. Also used for contour work, the saw will be exhibited by **Bill Lindsey Machinery Co.** together with drills, portable hand saws and grinders.

Trucking equipment will include the LeBus load binder, winch line tail chain, industrial hooks and snatch block, the last requiring no tools to open or close the side plates and having no threaded nuts or bolts to foul or lose. This company also will display a number of oil tools and will demonstrate its grooving installation process.

Flexible bronze, steel and stainless hoses and couplings, together with vibration absorbers and expansion joints will be exhibited by

the **Lone Star Rubber and Specialty Co.** Wire and rayon braid hydraulic, propane, butane and oil hoses will also be shown in conjunction with United States Rubber Company products.

The Storage Battery Division of **Thomas A. Edison, Inc.**, will have animated displays that will show the construction and performance of its nickel-iron-alkaline batteries which are extensively used in industrial operations such as powering material handling trucks, providing lighting and air conditioning for railroad cars and powering mine hauling equipment.

A battery-powered fork lift truck will be shown by **Lester F. Chickering Co.** which will also display a powered sweeper for warehouses, city streets and other outside areas.

Radio products, equipment for interoffice communication and dictating machines will be exhibited by **Sterling Radio Equipment Co.**

A demonstration of the making of barbed wire from coils of galvanized wire will be given by the **Sheffield Steel Corp.**

Safety equipment will be exhibited by **Allied Safety Equipment, Inc.**, and will include resuscitation equipment as well as preventive devices.



Chas. F. Reed



A. H. Russell



John Sheesley



Harry K. Smith



R. H. Startzell



H. A. Stone



M. E. Walter



H. J. Yoakum

# Southern Power and Industry's

## Directory of Exhibitors

### Houston Industrial Exposition

Houston, Texas, Houston Coliseum, May 10 through 14, 1950

#### —A—

A & M College System—Industrial Extension Div.	
College Station, Texas	741-746
Acme Fisher Co., Texas	
Houston, Texas	325
Acme Foundry & Machine Co.	
Blackwell, Okla.	434 B
Aerogrip Sales & Engineering, Inc.	
Fort Worth, Texas	630
Air Devices, Inc.	
Houston, Texas	220
Allan Company, Geo. B.	
Dallas, Texas	326
Atlas Valve Co., Johnson Corp., Thermol Eng. Corp.	
Allied Safety Equipment Co.	
Houston, Texas	425-427-429
Arcadia Mfg. Co., E. D. Ballard Co., J. H. Emerson Co.	
General Detroit Corp., Medical Supply Co., Safety First Co.,	
Scott Aviation Corp., U. C. Light Mfg. Co., Wilson Products,	
Inc.	
Alton Sales Co.	
Dallas, Texas	645
Atomized Materials Co., Wherry Eng. Co.	
Amercoat Corp.	
Los Angeles, Calif.	323 (Corrosion Eng. Co.)
American Mat Corp.	
Toledo, Ohio	646
American Metal Hose Co.	
Waterbury, Conn.	321-323 (Bettis Corp.)
Ampeo Metal, Inc.	
Milwaukee, Wis.	231
Anchor Coupling Co.	
Libertyville, Ill.	424 (Lone Star Rubber & Spec. Co.)
Anderson Equipment Co.	
Houston, Texas	124
AquaTherm, Inc.	
Houston, Texas	325 (Rowan & Buchanan)
Ara Auto Air Conditioning Co.	
Fort Worth, Texas	616-617 (Rupley Co.)
Arcadia Mfg. Co.	
Birmingham, Mich.	425-427-429 (Allied Safety Eqt. Co.)
Armstrong Machine Works	
Three Rivers, Mich.	324
Aro Equipment Co.	
Irwin, Ohio	336 (O'Neill Supply Co.)
Athey Products Corp.	
Chicago, Ill.	340-441 (Gulf Tractor & Eqt. Co.)
Atlas Valve Co.	
Newark, N. J.	326 (Geo. B. Allen Co. Sec.)
Atomized Materials Co.	
Pittsburgh, Pa.	645 (Alton Sales Co. Sec.)
Automatic Distributing Corp.	
Houston, Texas	741
Automatic Transportation Co.	
Chicago, Ill.	625 (L. F. Chickering Co.)

#### —B—

Band It Co.	
Denton, Colorado	328 (Ross K. Reed Co.)
Barber Plumbing Co., Inc.	
Houston, Texas	541-543
Barium Steel & Forge, Inc.	
Canton, Ohio	414 (Petro-Chem. Eqt. Co.)
Barold Sales Div. National Lead Co.	
Los Angeles, Calif.	113-115
Beaumont Tool Company	
Beaumont, Texas	229
Behrings Bearing Service, Inc.	
Houston, Texas	324-328
Stephen Adams Co.	
Bendix Westinghouse Automotive Air Brake Co.	
Elkhart, Ohio	616-617 (Rupley Co.)
Bettis Corp.	
Houston, Texas	321-323
Bevelly Shear Mfg. Co.	
Houston, Texas	420 (Mehl Mfg. Co.)
Big Three Welding Eqt. Co., Inc.	
Houston, Texas	524-526-528-530-532-534-536
Houston Oxygen Co., Lincoln Electric Co., Morton Gregory	
Corp., Nelson Sales Div., Obmsted Machine Co., Schramm	
Co., Smithfield Co., Victor Equipment Co., Worthington Co.	
Blaw Knox Div. — Blaw-Knox Co.	
Pittsburgh, Pa.	331-333A (Jas. A. Hall Co.)
Boardman Co.	
Oklahoma City, Okla.	525 (Rowan & Buchanan)
Brady Co., R. B.	
Houston, Texas	644
Brance Krachy Co., Inc.	
Houston, Texas	240
Electric Machinery Mfg. Co., Fulk Corp., Ft. Worth Steel	
& Machinery Co., Louis Allen Co., Reeves Pulley Co.	
Breidert Co., G. C.	
Los Angeles, Calif.	735 (Langhammer-Rumel Co. Sec.)
Brewer Machine Co.	
Hartford, Conn.	320 (DoAll Texas Co.)
Briggs Filtration Co.	
Washington, D. C.	421 (M. N. Dannenbaum Co.)
Briggs-Weaver Machinery Co.	
Houston, Texas	725

Bruning Co., Inc., Charles	
Houston, Texas	540-641
Bullard Co., E. D.	
San Francisco, Calif.	425-427-429 (Allied Safety Eqt. Co.)
Bureau of Mines—U. S. Dept. of the Interior	
Dallas, Texas	738-740-742
Burgess-Manning Co.	
Libertyville, Ill.	414 (Petro-Chem. Eqt. Co.)

#### —C—

Caterpillar Co.	
Peoria, Ill.	340-441 (Gulf Tractor & Eqt. Co.)
Catskill Metal Works	
Catskill, N. Y.	320 (DoAll Texas Co.)
Century Geophysical Corp.	
Tulsa, Okla.	249
Chicago Metal Hose Corp.	
Chicago, Ill.	624 (Lone Star Rubber & Spec. Co.)
Chicago Pneumatic Tool Co.	
New York, N. Y.	Outside (Stewart & Stevenson Serv. Inc.)
Chickering Co., Lester F.	
Houston, Texas	625
Chrysler Motor Co.—Engine Div.	
Detroit, Mich.	Outside (Stewart & Stevenson Serv. Inc.)
Clark Mfg. Co.	
Cleveland, Ohio	438-440-442 (Eggelhof Engineers)
Cagedill Twist Drill Co.	
Detroit, Mich.	414 (Petro-Chem. Eqt. Co.)
Colson Equipment & Supply Co.	
Los Angeles, Calif.	221 (C. G. Forshey)
Combustion Control Corp.	
Cambridge, Mass.	327-329 (L. R. Ward Co.)
Commercial Filters Corp.	
Houston, Texas	433-437 (Stone Supply Co., Inc.)
Continental Motors Corp.	
Muskegon, Mich.	Outside (Stewart & Stevenson Serv. Inc.)
Cook Electric Co.	
Chicago, Ill.	640 (Southwestern Engr. & Eqt. Co.)
Corrosion Engineering Co.	
Houston, Texas	223
Amercoat Corp., Rotomolds, Inc., Rusticite Products Co.	
Technique Eastman Corp.	
Cos & Blackburn, Inc.—Air Conditioning & Commercial Dept.	
Houston, Texas	533
Frigidaire Co.—Commercial & Air Conditioning Dept.	
Crumppacker Distributing Corp.	
Houston, Texas	144, 245, 721
Cummins Sales & Service, Inc.	
Ft. Worth, Texas	632
Cuno Engineering Corp.	
Meriden, Conn.	438-440-442 (Eggelhof Engineers)
Curtin & Co., W. H.	
Houston, Texas	431-433
Curtis Refrigeration Mfg. Co.	
St. Louis, Mo.	541-543 (Harber Plumbing Co.)

#### —D—

Dannenbaum Co., M. N.	
Houston, Texas	421
Briggs Filtration Co., Hammel-Dahl Co., Milton Roy Co.	
Mixing Equipment Co., Peerless Pump Div., Food Machin-	
ery Corp., Republic Pipe Meters Co., Thomas Flexible	
Coupling Co., Varnall Waring Co.	
Day Co., S. D.	
Houston, Texas	1123
Despatch Oven Co.	
Minneapolis, Minn.	634-636 (Haylett O'Neill)
D-Walt, Inc.	
Lancaster, Pa.	734 (Pat O'Reilly Co.)
Diamond Chain Co.	
Indianapolis, Ind.	332-334 (Kreiter Ind. Sup. Inc.)
Diamond Saw Works, Inc.	
Buffalo, N. Y.	414 (Petro-Chem. Eqt. Co., Inc.)
DoAll Texas Co.	
Houston, Texas	320
Brewer Machine Co., Catskill Metal Works, Hager Ma-	
chinery & Tool Co., Torit Mfg. Co., Wade Tool Co., Waltz	
Fy-nare Co.	
Dole & Krump Co.	
Chicago, Ill.	420 (Mehl Mfg. Co.)

#### —E—

Eastman Oil Well Survey Co.	
Denver, Colorado	341
Eberhardt-Denver Co.	
Denver, Colorado	332-334 (Kreiter Ind. Sup. Inc.)
Eclipse Pioneer Div. Bendix Aviation Corp.	
Teterboro, N. J.	325
Edison, Inc., Thomas A.—Edison Storage Battery Div.	
West Orange, N. J.	629-631
Eggelhof Engineers	
Houston, Texas	438-440-442
Clark Mfg. Co., Cuno Engineering Corp., Industrial Eqt.	
Co. of Houston Kelsey & Mueller, Inc., Magnetrol, Inc.,	
Moore-Jane Co., C. H. Wheeler Mfg. Co.	
Emco Corp.	
Chicago, Ill.	414 (Petro-Chem. Eqt. Co., Inc.)
Electric Machinery Mfg. Co.	
Minneapolis, Minn.	240 (Brance-Krachy Co., Inc.)

Emerson Co., J. H. Cambridge, Mass. 425-427-429 (Allied Safety Eqt. Co.)  
 Enzinger Union Corp. Angola, N. Y. 238

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Failing Supply Co., Geo. E. Enid, Okla. Outside  
 Fairmount Tool & Forging, Inc. Cleveland, Ohio 625 (Rogers Distributing Co.)  
 Falk Corp. Milwaukee, Wis. 240 (Brance-Kracy Co. Inc.)  
 Fannin, Ralph Houston, Texas 432-437  
 Farnell Corp., Herbrand Div.—Bingham Herbrand Corp. Hills McCanna Co., Midwest Foundry Co.—Div. L. A. Darling Co., Rolock, Inc. Utility Steel Foundry  
 First Aid Station & Display—Harris County Emergency Corps, Inc. Houston, Texas 16  
 Fiske Bros. Refining Co. Newark, N. J. 330-10 Neill Supply Co.  
 Flannigan Trailer Sales Houston, Texas 19-A  
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 Pollis Visual Services Houston, Texas 109  
 Ford Motor Co. Houston, Texas 729  
 Forshey, C. G. Houston, Texas 221  
 Coston Eqt. & Supply Co.; Hanna Engineering Works; Lou-  
 den Machinery Co.; Mathews Conveyor Co.; Merrick Scale  
 Co.  
 Fort Worth Steel & Machinery Co. Ft. Worth, Texas 240 (Brance-Kracy Co., Inc.)  
 432-534 (Kreiter Industrial Sup. Inc.)  
 Fram Corp. East Providence, R. I. 329-A  
 Frigidair Co. Air-Conditioning & Commercial Dept. Dayton, Ohio 533 (Cox & Blackburn, Inc.)

-G-

Gardner Denver Co. Quincy, Ill. Outside (Stewart & Stevenson Serv. Inc.)  
 General Detroit Corp. Detroit, Mich. 425-427-429 (Allied Safety Eqt. Co.)  
 General Motors Corp.—Detroit Diesel Engine Div. Detroit, Mich. Outside (Stewart & Stevenson Serv. Inc.)  
 Goslin-Birmingham Mfg. Co., Inc. Birmingham, Ala. 523  
 Griddle Stamp & Stencil Co. Houston, Texas 311-317  
 Gulf States Trailer Co. Houston, Texas 19-A (Yanks-Herbrand Mfg. Co.)  
 Gulf Tractor & Equipment Co. Houston, Texas 540-441  
 Athey Products Corp.; Caterpillar Tractor Co.; Hyster Co.;  
 Three Shovel Co.; Trackson Co.

-H-

Hager Machinery & Tool Co. Queens Village, N. Y. 720 (DeAll Texas Co.)  
 Hall Co., James A. Houston, Texas 331-332-A  
 Hlaw-Knot Box Co. Blaw-Knot Co. Hammel-Dahl Co. Providence, R. I. 421 (M. N. Dannenbaum Co.)  
 Hanna Engineering Works Chicago, Ill. 221 (C. G. Forshey)  
 Harvill Corp. Los Angeles, Calif. 432-434 (Ralph Fannin)  
 Haveg Corp. Newark, N. J. 829  
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 Hills McCanna Co. Chicago, Ill. 432-434 (Ralph Fannin)  
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 Houston Oxygen Co. Houston, Texas 538-A  
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 Hyster Co. Peoria, Ill. 340-441 (Gulf Tractor & Eqt. Co.)

-I-

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 Industrial Equipment Co. of Houston Houston, Texas 438-440-442 (Eggelhof Engineers)  
 Instruments, Inc. Tulsa, Okla. 629 (Southwestern Comm. Sales & Serv. Co.)  
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 Kieley & Mueller, Inc. North Haven, N. J. 438-440-442 (Eggelhof Engineers)  
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 Diamond Chain Co.; Eberhardt Denver Co.; F. Worth Steel  
 & Machinery Co.; Master Elec. Co.; Union Gear & Ma-  
 chine Co.

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Langhammer-Rummel Co. San Antonio, Texas 735  
 G. C. Hissler Co.; McDonald & Miller; Research Products Co.  
 Layne Texas Co., Ltd. Houston, Texas 621  
 LeBus Rotary Tool Works Longene, Tex. 529-531  
 Lincoln Electric Co. Cleveland, Ohio 524-526-528-530-532-534-536  
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 Mathews Conveyor Co. Filwood City, Pa. 221 (C. G. Forshey)  
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 Mohl Hout Mfg. Co. Houston, Texas 420  
 Beverly Shear Mfg. Co.; Drexel & Krump Co.; J. F. Kidder  
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 shalltown Mfg. Co.; Miller Elec. Co.; Parks Woodworking  
 Company; Rex Welder & Eng. Co.; Rotex Punch Co.; San  
 Angelo Edrs. & Mch. Co.; Service Machine Co.; Whitney  
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 Rotex Punch Co.; San Angelo Edrs. & Mch. Co.; Service  
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 Midwest Foundry Co. Div. L. A. Darling Co. Coldwater, Mich. 422-434 (Ralph Fannin)  
 Miller Electric Co. Appleton, Wis. 420 (M-Hl Mfg. Co.)  
 Milton, Roy Co. Philadelphia, Pa. 421 (M. N. Dannenbaum Co.)  
 Mixing Equipment Co. Rochester, N. Y. 421 (M. N. Dannenbaum Co.)  
 Moorelane Co. Tulsa, Okla. 438-440-442 (Eggelhof Engineers)  
 Morton Gregory Corp.—Nelson Sales Div. Lorain, Ohio 524-526-528-530-532-534-536  
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—N—

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—O—

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DeWalt, Inc.; Porter Cable Machine Co.; Smithway Ma-  
chine Co.

—P—

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Peerless Pump Div. Food Mach. Corp.  
Los Angeles, Calif. ....421 (M. S. Dannenbaum Co.)

Perry Equipment Co.  
Mineral Wells, Texas ....414 (Petro-Chemical Expt. Co. Inc.)

Petro-Chemical Equipment Co., Inc. ....414  
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Twist Drill Co.; Diamond Saw Works, Inc.; Eimer Corp.;  
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Filter Corp.; Perry Equipment Co.; Reading Chain & Block  
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Phelan Fanst Paint Co.  
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Pyle National Co.  
Chicago, Ill. ....321-323 (Bettis Corp.)

—R—

Radio Corp. of America  
Harrison, N. J. ....230 (Sterling Radio Products)

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Reading Chain & Block Corp.  
Reading, Pa. ....414 (Petro-Chemical Expt. Co. Inc.)

Reed Co., Ross K.  
Houston, Texas ....828  
Rand R. Company

Reeves Pulley Co.  
Columbus, Ind. ....246 (Branch-Kracy Co., Inc.)

Reliable Automatic Sprinkler Co.  
Mt. Vernon, N. Y. ....541-543 (Barber Plumbing Co. Inc.)



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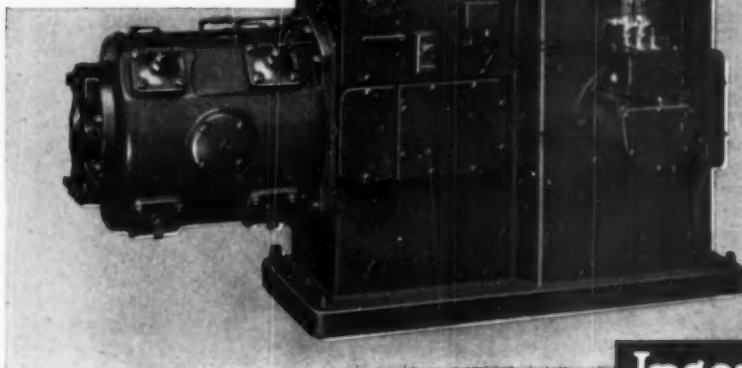
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## IN ELECTRIC-DRIVEN AIR COMPRESSORS

that means lower costs of Installation, Operation and Maintenance



- Pipeless, thru-frame air flow
- Air connections on sturdy frame
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- Full force-feed lubrication



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THE SIMPLEST  
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MOST ACCESSIBLE  
MOST ECONOMICAL  
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HEAVY-DUTY  
CROSSHEAD-TYPE

•  
TWO-STAGE  
80 to 125 psi

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SIZES  
125 to 350 hp

The XLE incorporates a "new look" and a new idea in air-compressor design. It is a heavy-duty, well-balanced, easy-to-keep-clean machine that can be installed with an absolute minimum of effort, time, and cost . . . on a minimum of foundation.

Simplicity of XLE construction, and advanced-design features such as aluminum-alloy full-floating bearings that require no adjustments in a sealed, dust-tight crankcase, result in lower-cost maintenance and a higher degree of dependability.

The XLE is a highly efficient compressor built for continuous, full-load operation, and is ideal for factories, railroad shops, mines, powerhouses, and large construction jobs. It is particularly suitable wherever skid-mounting, factory floor, or ground conditions require a well-balanced machine.

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# XLE

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SOUTHERN POWER & INDUSTRY for MAY, 1950

# Maintenance of Refrigeration Plant Means Profits

By R. S. Sandifer

Sales Engineer, Southwest District  
York Corporation, Houston, Texas

**T**HERE are various factors which affect the cost of power, and of maintenance of a refrigeration plant. Some of these are listed below:

## 1. Condensing Pressure

A large percentage of inefficiency is due to excessive condensing pressure. Many existing plants do not have pressure gauges installed. Every refrigeration plant should have a permanent suction pressure gauge, and condensing pressure gauge. These should be good reliable gauges. They will soon pay for their small cost. Assuming the plant has accurate pressure gauges, frequent checking of the gauges will pay off. If the condensing pressure is as much as 10 pounds above normal, there is a power penalty of approximately 5% in kilowatt hours per ton of refrigeration. The cause of excess pressure should be found, and corrected. Assuming an adequate supply of condensing water at a reasonable temperature, then excessive condensing pressure may be caused by:

- (1) Air in the system
- (2) Dirty condenser
- (3) Insufficient condenser capacity

Whatever the cause of excessive condensing pressure might be, it should be corrected because it is costing money to allow it.

## 2. Suction Pressure

Many plants are operated at a suction pressure lower than required by the temperature level of their cooling load. Remember that if the suction pressure can be raised as much as 5 pounds, the kilowatt hour per ton of refrigeration may be reduced as much as

15%. Very often, the power savings effected by adding more evaporator surface, and raising the suction pressure will more than pay for the additional investment.

## 3. Flexibility

Lack of flexibility often penalizes the owner of a refrigerating plant. The flexibility of a refrigerating plant is dependent upon the number of compressors, and means of capacity reduction. Many times a plant has adequate compressor capacity for normal load, but under reduced loads the compressor is oversized. This means inefficient operation, and investigation may reveal that an additional smaller compressor can be purchased for the power savings. And sometimes the same purpose can be accomplished by arranging for operating one compressor at reduced speed during low load periods.

## 4. Liquid Slopover

Liquid slopover has probably caused more compressor failures, and maintenance expense than any other condition. A compressor pumping liquid requires a lot more power than a compressor pumping gas. Frequent or prolonged operation under slopover conditions not only consumes excessive power, but also runs up heavy repair bills, particularly on modern compressors where clearances are less, and speeds are higher than in older units.

The liquid refrigerant entering the compressor cylinder destroys any trace of cylinder wall lubrication. This leads to scored cylinders, and excessive piston ring wear. Also, the cylinders are

normally warm, and when the cold liquid refrigerant hits them, there is a rapid expansion and contraction of the metal which again adds up to scored cylinders and excessive wear.

The best method of preventing liquid slopover is the use of a suction trap, and liquid pump. The suction trap catches any liquid that may be in the suction line. The liquid pump transfers the liquid from the suction trap to the high pressure receiver.

## 5. Suction Superheat

Excess suction superheat can cause excessive maintenance costs. The discharge temperature leaving the compressor may increase as much as 10 degrees for every degree of suction gas superheat. If the discharge temperature becomes too high, the lubricant breaks down, and the valves become carbonized and stick. Where excess suction gas superheat is encountered, it should be corrected. This can be done by merely expanding liquid into the suction line.

## 6. Lubricating Oil

Using an inferior grade or incorrect type of lubricating oils will cost in repair bills many times the difference in the price between good, and cheap oil. In fact, use of the wrong lubricant is just plain carelessness. Consult the manufacturer of your compressor for the recommended oil to use.

## Modernization

The final thought on saving money for the owners of refrigerating plants involves additional investment for newer, modern, and more efficient equipment. Often the increased efficiency will pay for the additional investment. Why not call in a reputable qualified engineer, and have him survey your plant for means of making more profits for you.





## No chip on our Shoulder!

Despite our occasional "voice of protest" against certain practices in the inter-city commercial transportation field today, the Southern Railway isn't "mad" at anyone.

But we do feel that we have an obligation to you...and to ourselves...to speak out strongly against a situation which is not only strangling America's railroads...but threatening this country's basic, free-enterprise system of which the railroad industry is the keystone.

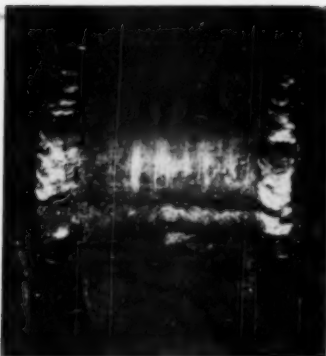
The self-supporting, tax-paying railroads welcome fair and honest competition. But *is* it fair to require them to compete for business with air, water and highway carriers who offer their services at *less than cost*...because your tax dollars...and ours..."make up the difference"? *Is it good for America?*

We don't think so. America's strength was built...not on tax-dollar handouts...but on fair play and self-reliance. Let's build a *strong* transportation system...in all its forms...the same way. The American way! The railroad way!

*Ernest E. Norris*  
President

# SOUTHERN RAILWAY SYSTEM





WORN SPOTS ON THIS 2,000 LB CRANKSHAFT WERE WELDED OVER AND MACHINED TO SIZE. METHOD GIVES SAME SERVICE LIFE AS AN ALL-WELDED BUILD-UP AND IS CONSIDERABLY CHEAPER.  $\frac{5}{8}$ -IN. CAPS WERE SCARFED TO ALLOW WELD PENETRATION INTO  $5\frac{3}{4}$ -IN. DIAMETER SHAFT. COST OF JOB WAS ABOUT \$30.

## Repairing Worn Parts by Welding

*Restoring worn parts to useful service by welding saves irreplaceable and expensive parts, eliminates loss through downtime, and saves money. Here are suggestions for techniques and procedures to follow to get the most out of your welded repairs.*

**By J. E. Durstine**

District Manager  
The Lincoln Electric Co.  
Birmingham, Alabama

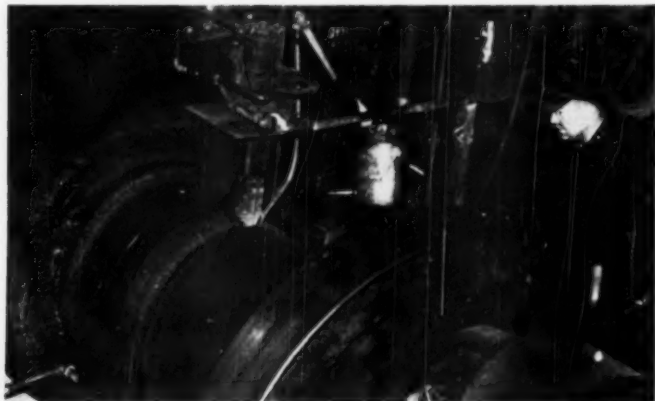
**M**AINTENANCE personnel find innumerable uses for welding in their work every day, and one of the most important of these is that of restoring worn parts to useful service.

The importance of welding worn

surfaces in plant operation is illustrated by typical jobs done at the El Paso Copper Refinery, El Paso, Texas.

A ring gear in the turning mechanism of a furnace charger lost a tooth. A new tooth was built up

by welding in eight hours without removing the gear, eliminating what would have been a 12-day shutdown and a 600-hour job to replace the gear. The chain pockets in a chain sheave became worn oversize from corrosion. The pock-



USE OF AUTOMATIC EQUIPMENT IS ANOTHER COST SAVING POSSIBILITY. THESE HIGH CARBON (APPROXIMATELY .80%) CAST ALLOY STEEL BACK-UP ROLLS WEIGH 90,000 LB AND HAVE A BEARING JOURNAL DIAMETER OF 31-IN. TO BUILD UP WORN JOURNALS, ROLLS ARE PREHEATED TO 600 F AND MOUNTED IN AN OLD LATHE TO WHICH IS ATTACHED AN AUTOMATIC HEAD. JOURNAL IS BUILT WITH A SINGLE PASS BY REVOLVING ROLL SLOWLY UNDER THE HEAD. WELDING TIME PER ROLL IS 7 HOURS. THEY ARE STRESS-RELIEVED AND FURNACE COOLED.

NOW! AT NO INCREASE IN COST TO YOU



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STEAM TRAPS  
ARE SOLD BY  
OVER 200  
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THERE IS ONE  
NEAR YOU.**

Write for name and address.

Nearly 650,000 Yarway Impulse Steam Traps have already been installed—proof that they are doing a good job.

Now a *stainless steel* body makes this famous little trap even better—at no increase in cost.

Better in *wear*, better in *service*. Users will find Yarways require less maintenance than ever. All parts are wear-resistant, practically wear-proof. There is only one moving part, a small, stainless steel, heat-treated valve. Important, too—Yarway Impulse Traps are suitable for all pressures up to specified maximum without change of valve or seat.

Other popular advantages are *small size*, *light weight*, *easy installation* and *low cost*. Often it costs less to buy a new Yarway trap than to repair an old, ordinary trap.

In performance—ask any user. They all say Yarways are the traps that *get equipment better sooner and keep it hot!*

For better steam trap performance, try new stainless steel Yarways.

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# **YARWAY**

## **IMPULSE STEAM TRAP**

ets were built back to size by depositing electrode metal for a cost of only \$125. More important than the low cost of the repair, however, was that replacement parts required several months delivery.

Another type of repair is illustrated by an agitator shaft and coupling which became worn out by splashing acid. After building up the coupling, a  $\frac{1}{8}$ -in. covering of stainless steel electrode was deposited over all exposed surfaces. Not only was the coupling thus made better, but being able to make the repair avoided a costly shutdown of vital equipment.

#### Procedures

When undertaking a repair job, don't simply pick up the handiest mild steel electrode and start to put down metal on the worn part. Analyze the job, with the service conditions in mind, to see if some improvement in performance can be made. Secondly, it should be looked at to determine the cheapest way of welding the job.

In many cases a piece of steel can be welded over a worn spot and machined to size. This avoids building up worn areas completely with weld metal and requires considerably less time. The lead illustrations show how this was done to a worn 2,000 lb crankshaft for a forming press that operates sixteen hours a day with a pressure on the journals of 2800 psi.

The shaft journal was first machined undersize to give a flat surface. Two steel caps  $\frac{5}{8}$ -in. thick were formed and placed around the shaft. These caps were both scarfed so that welds will penetrate through to the journal surface. An E6012 electrode, Fleetweld No. 7, was used to weld the caps, which were then machined to the correct size. This method of repair gave the same service life, eighteen to twenty-four months, as an all-welded build-up and was considerably cheaper.

#### Automatic Equipment

Another cost saving possibility is the use of automatic welding equipment in building up surfaces for remachining. Automatic hidden arc welding not only deposits metal faster and more uniformly than hand welding but also can be used

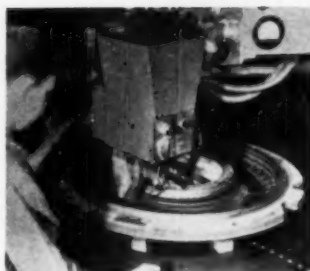
in building up high carbon steels. Versatility will be noted in the two illustrations.

#### Type of Metal

For all weld surfacing, automatic or hand, the type of metal being welded will influence the procedure.

Ordinary mild steel does not have its physical characteristics greatly changed as a result of heating and cooling. For welding mild steel .30% carbon maximum, no special precautions such as preheating are needed. An E-6012 electrode is the best type for depositing the build-up. The deposit is more machinable than that of an E-6010 electrode. The arc action is less penetrating than that of E-6010 and builds up more readily.

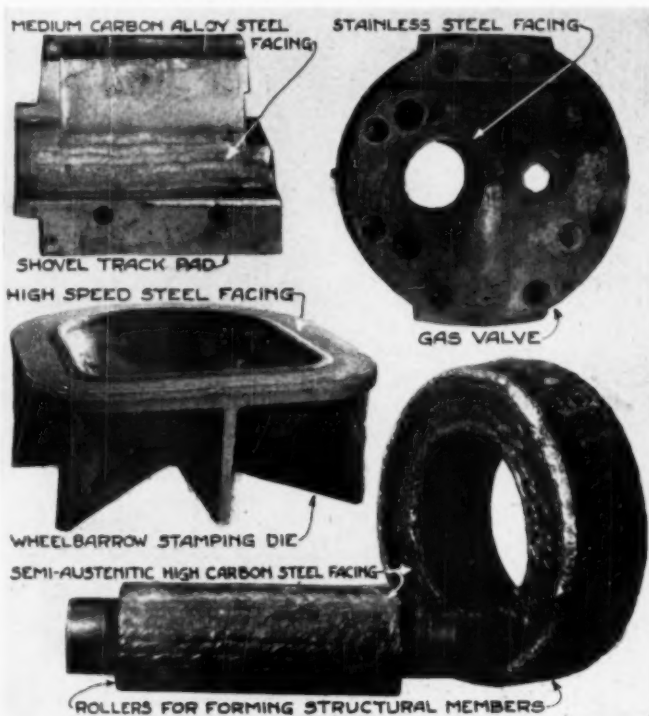
Medium to high carbon steels, tool steels, cast iron and in general all hard metals have their physical characteristics changed considerably as a result of the application of welding heat. These metals will crack due to thermal shock when



THE CURING MOLDS ARE MADE OF HIGH SULPHUR FREE MACHINING STEEL IN WHICH IT IS SOMETIMES DIFFICULT TO DEPOSIT A WELD COMPLETELY FREE OF POROSITY. WITH HIDDEN ARC WELDING, OLD IDENTIFICATION MARKS CAN BE FILLED IN WITH A DENSE HOMOGENEOUS WELD THAT IS REALLY MACHINABLE. MOLDS ARE MOUNTED ON A REVOLVING FIXTURE WHICH ROTATES WORK UNDER THE STATIONARY HEAD.

an arc is struck on them. To avoid this, hardness can be reduced by annealing or thermal shock reduced through gradual preheating. Preheating plus slow cooling after

VARIOUS TYPES OF APPLICATIONS FOR HARD STEEL BUILD-UP.



**A BAG FULL OF**  
*Special*  
*Shapes*  
**FOR FAST REFRACTORY REPAIRS**

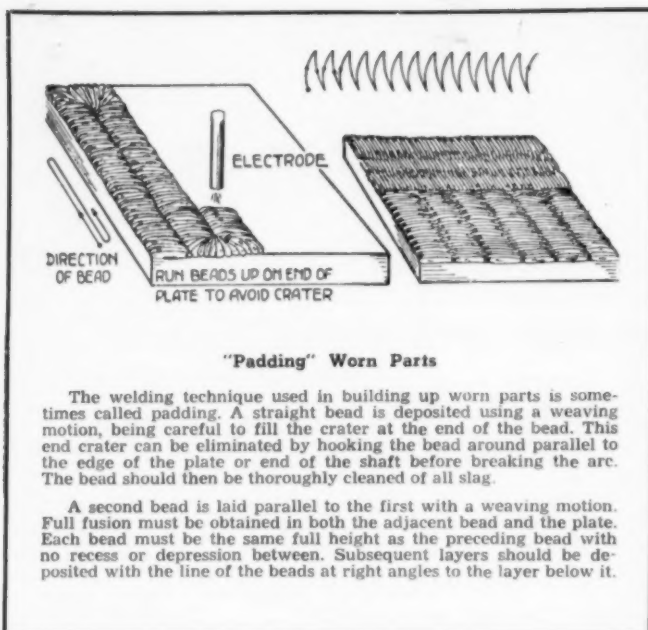
And remember, KAOCAST is just one of B&W's *complete* line of Refractory Castables, all designed to reduce construction and maintenance costs in low, intermediate, and high-temperature furnaces.

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welding will also minimize the hardening of metal adjacent to the weld as a result of the welding heat cycle. In general, preheating to 300 to 500 F will prevent weld-hardening in medium to high carbon steels.

The use of E-6016 and E-7016 electrodes, the so-called lime-ferritic type, will also be helpful in welding high carbon steels. The low-hydrogen weld deposit made by these electrodes in high carbon steels is ductile and has less tendency to underbead cracking. Preheating can frequently be eliminated by using an E-6016 or E-7016 electrode.

In building up gear teeth or shafting, the worn part can frequently be made stronger than it originally was by building up with an E-7010 electrode. This electrode makes a weld with a minimum tensile strength of 70,000 psi. For building up such things as rail ends or dies a still stronger electrode of the E-10010 class may be used. This gives a deposit of 100,000 psi minimum tensile strength.

A stainless electrode is useful in build-up work for joining **dissimilar metals**. It can be used to build

up a mild steel surface to which it is desired to weld a high carbon steel. It can also be used satisfactorily for welding on high carbon and manganese steel parts. It is excellent for surfacing applications where corrosion conditions are severe.

For building up **cast iron** for re-machining, a non-ferrous alloy electrode makes a machinable deposit. For best machinability a two layer deposit is recommended. Where a large deep area is to be filled, it will be more economical to fill in with a ferrous cast iron electrode up to 1/8-in. of the surface to be machined and then finish with several layers of a non-ferrous type electrode.

Shielded arc electrodes are also available for welding **bronze, brass and copper**. These electrodes can be used to fill in bronze castings or build up a bronze surface on steel or cast iron. Bearing surfaces, impeller blades and valves can be restored with these electrodes.

#### Welding Techniques

The surface of the work should be cleaned of all dirt and foreign matter to eliminate possibility of

porosity and holes from that source. Where the built-up surface is to be machined to a final dimension, the work must be cut down first before welding. This is so that when the weld deposit is made, the line of final machining will come through near the top of the deposit and not at the junction zone.

When welding a shaft near one of its ends the beads should run parallel to the axis of the shaft. After the first bead is deposited, the shaft should be turned 180 degrees to place the second. The third bead will be placed adjacent to the first and the fourth next to the second. Rotating the shaft between beads avoids warping the shaft. If the place to be welded is not near the end and is short, it is advisable to weld around the shaft, turning the shaft as the weld is being made.

At all times, when welding shafts, the analysis of the material should be determined so that any necessary steps to avoid weld-hardening and embrittlement of the shaft can be taken. Care must also be taken to avoid all weld porosity near a shoulder or a keyway. Sulphur in the shaft material may cause porosity which should be chipped out and rewelded. Keyways can be filled with copper slugs to keep them from being filled up by weld metal. When building up a worn keyway and welding heat must be applied in one spot, the opposite side of the shaft should also be heated to minimize warping.

In building up gear teeth the analysis of the metal must again be taken into consideration to determine what heat treatment, if any, is necessary. On small gears the tooth is generally built up completely with weld metal using stringer beads, small electrodes and low amperage. On larger gears, filler metal of preshaped inserts or high carbon round bars are welded into the tooth to decrease the amount of weld metal required. An experienced welder can frequently deposit beads so that little or no grinding or filing is needed to shape the welded tooth. Harder electrodes, E-7010 or E-10010, or hard facing electrodes are sometimes used for the final pass on gear teeth to increase service life.

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Unless you figure them in  
*aluminum*, you don't

# figure low

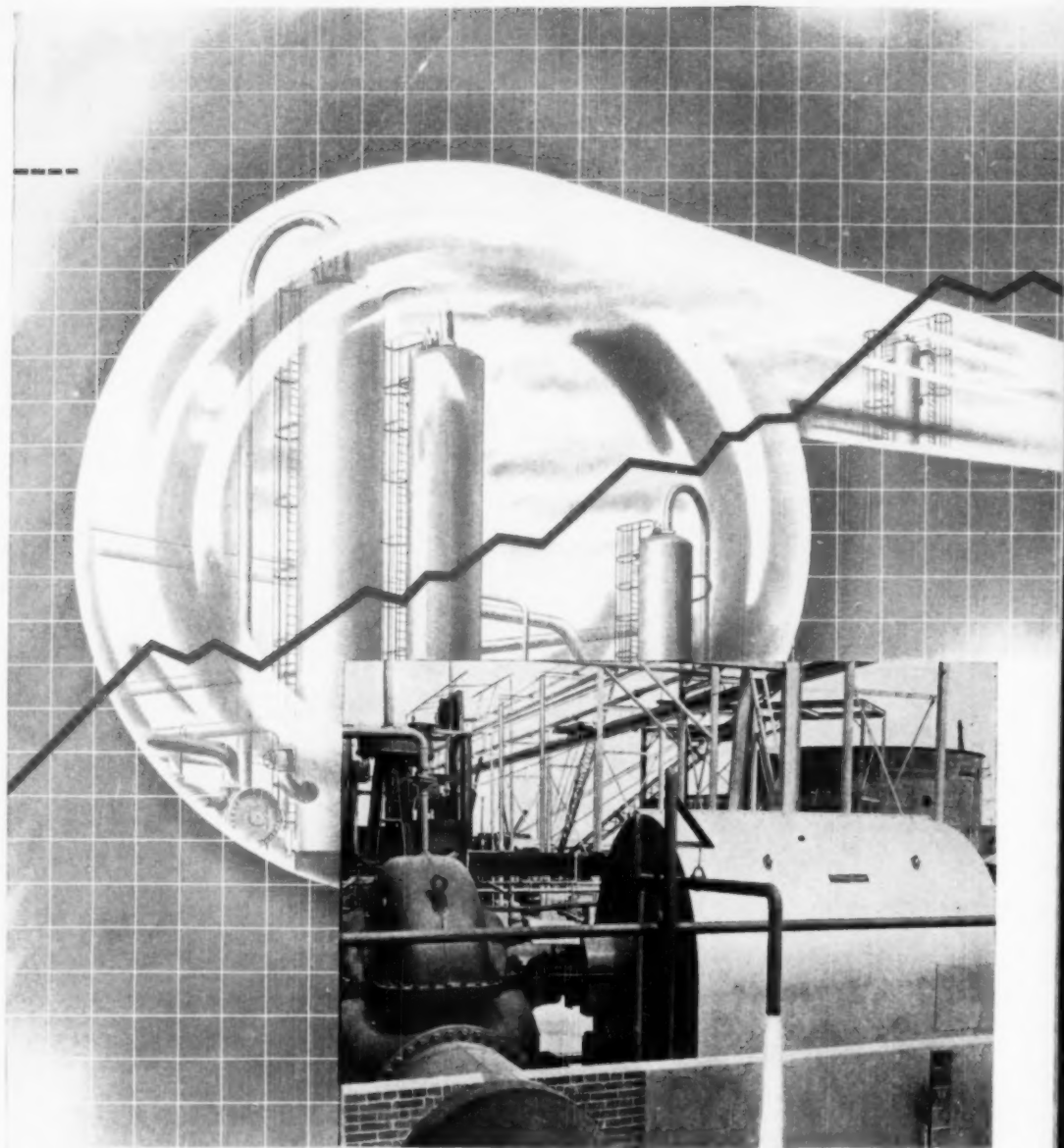
Be sure you get prices on your feeders both ways—in aluminum and in copper. You'll be surprised how much you can save with *aluminum*.

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of ALCOA <sup>EC</sup> ALUMINUM are made by leading manufacturers



### **SOUTHERN CHEMICALS, More Output...More Income**

Typical fast grower: the Southern chemical industry. Since 1939, sales volume has quadrupled, now tops \$4 billion annually (fourth highest Southern industry). Yearly payrolls of  $\frac{3}{5}$  billion go to 200,000 employees.

Topnotch electrical equipment helps the industry keep costs down, sales up. Take the big 1,500-hp motor shown above in a large chemical plant in Texas. The atmosphere is corrosive. To cool the windings they once had to build costly air-conditioned houses around these motors. So Westinghouse engineers designed a *water-cooled-enclosed* motor. It worked like a charm. Now, no more houses, cool safe windings. In thousands of ways like this, Westinghouse helps industry cut costs. *And lower costs eventually mean more sales and more growth.*

YOU CAN BE **SURE**.. IF IT'S  
**Westinghouse**



## Why is the South's share of the national income up 25%?

Carve up the total U. S. income. In 1929 the South got one-fifth. Today the South's share is one-quarter—a 25% increase. Americans are making more money than they did twenty years ago. But Southerners are gaining *almost half again as fast* as the rest of the nation!

One big reason is the growth of Southern industry. Since 1939, the value of goods made in the South has climbed 277%. Plants are bigger, new plants are building. And, just one new average-sized plant requires an investment of \$100,000, writes \$200,000 worth of pay checks per year, pays out one million dollars annually in trade expenditures!

Westinghouse is proud to have played a part in this growth. Industry needs power; and much of

the South's generating apparatus was engineered by Westinghouse. At the receiving end of the power line, Westinghouse developments help industry use power more efficiently to produce better products at lower cost.

Early in the company's history Westinghouse built plants of her own in the South. These plants now employ some 4,000 Southern workers and executives. They use raw materials from Southern mines, mills, farms and forests.

As a supplier to the South, as a customer, as a Southern producer, we have become a basic part of the South—with deep roots in the soil, a basic stake in its future. When you have a problem in making or using electricity, your nearest Westinghouse office is a good place to go. J-94826

**Westinghouse**

**A BASIC PART  
OF THE SOUTH**



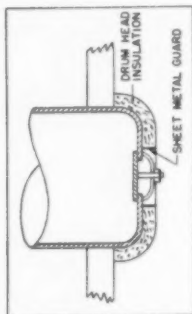
# Maintenance

## Problems and Solutions

The following short articles describe specific jobs that serve as case studies of accepted procedures and methods

### Guard for Insulation

As every boiler operator knows, it does not take long to knock the insulation off the drum head of a boiler, particularly around the manhole.



This loss of insulation is not important from a heat-loss point of view, but it detracts from the appearance of an otherwise clean and neat boiler room. Furthermore, this chipping at the edges can, in time, encourage further deterioration of the insulation over the entire drum head.

It is easy to put a stop to this breaking off of insulation so that even a heavy blow against the manhole will do no damage. Simply take a steel strap of a width equal to the thickness of the drum-head insulation and bend it into the elliptical shape of the manhole opening. The strap can be of any convenient thickness, but

something around 1/16" will be fairly easy to bend and is sufficiently strong.

This guard is then placed in the manhole opening and tack welded to the drum at four points. It should fit snugly against the insulation to protect it. If the insulation has been previously damaged, it should be repaired, bringing it up against the guard. It is important to merely tack weld the guard rather than weld it completely to the drum head, for ASME Boiler

Code will not permit welding, other than tack welding, to a pressure vessel.

At least one boiler manufacturer is putting these insulation guards on all drums of new boilers and are putting small guards around the data plate on the end of the drum. However, similar guards made in the plant machine shop can be attached to any boiler and will save considerable minor maintenance over the years.

H. H. RUSSELL (N. C.)

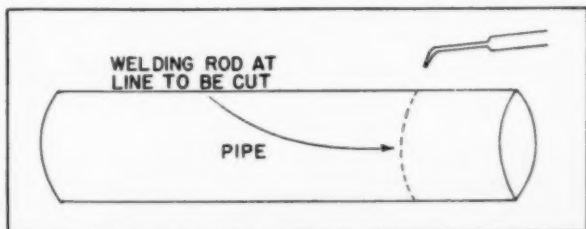
### A Smooth Cut on Cast Iron Pipe

ALL too often cast iron pipe when cut with the ordinary cutting torch leaves a rough edge. This may easily be avoided.

First carefully mark the point where pipe is to be cut, and draw a line around the pipe. Then take a piece of ordinary welding rod, and after making certain it follows the line marked off for the cut, tack-weld each end of the welding rod around the pipe.

Place the cutting torch slowly back and forth over the welding rod so it will become heated and start to melt. Proceed to make the cut with the torch as usual, holding the cutting torch in such a position that the melting welding rod will strike the line on the pipe being cut. Result should be a perfectly smooth cut similar to cuts usually attained on steel pipe, etc.

LEE BRADY (KAN.)





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TYPE EM ENCLOSURE  
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Three styles of enclosures are available as illustrated.

Fedders Wall Radiation for steam and hot water lines is available in lengths from 2 to 12 feet in 6 inch increments. 38 and 50 fins per foot on 1½ inch tube and 24 fins per foot on 2 inch tubes. Write for catalog WR-C1 TODAY.

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having sloping top  
with die-formed  
louvered grille.

**FEDDERS-QUIGAN CORPORATION**  
BUFFALO 7, N. Y.

# Quigan

### Licking Wear Problems

**C**OAL, as anyone engaged in the operation and maintenance of coal handling equipment knows, is extremely abrasive and wear is very rapid. Power plants in particular are well aware of this because their conveyor equipment must feed coal around the clock seven days a week, and it doesn't take long before new parts show serious signs of wear.



In one large power plant, coal is dropped from an automatic weighing machine directly onto a screw conveyor which also moves the coal the entire length of the hopper to feed a spreader type stoker. three-quarters of an inch to fine. The coal used ranges in size from and the daily consumption runs about 125 tons.

The first screw is ten feet long and experience has proven that this part bears the brunt of the wear. Even when the heaviest models available were installed, they failed to last more than nine months at most. For several years the engineers of this plant have been experimenting with various hard overlaying alloys in an effort to economically extend the lives of these parts, and in the last few years they have finally developed

a technique that is highly satisfactory.

EuteChrom 130, an AC-DC electrode produced by the Eutectic Welding Alloys Corporation, is the alloy that provided the key to the solution, and the welders have found that the alloy applies equally well to either new or used parts. Here is how the job is handled.

Using 3/16" EuteChrom 130, the welder runs stringer beads around the outer edge of the screw using direct current reverse polarity at the lowest possible amperage. Axial beads are then spaced around the shaft, particularly in the areas on which the coal is dropped. Beads are also run radially about an inch and a half apart on the

wearing surface of the flight and the job is completed. The entire operation is handled very quickly by the average welder without the necessity of special equipment of any sort.

In actual operation, screws that are overlayed in this manner last more than twice as long as new ones. It has also been found that a second application of EuteChrom 130, after long usage, is extremely successful in extending the life of these conveyor parts over a much greater period of time.

The alloy applies easily to both cast iron and steel and many worn parts can be quickly rebuilt so that they will outlast new replacements.

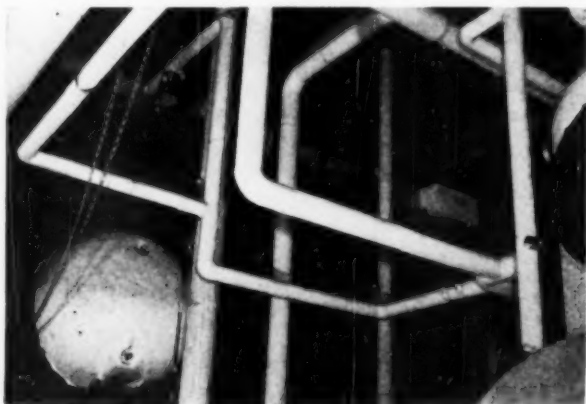
### Trustworthy Piping

**Y**OU'LL have to look hard to find any screwed fittings in the network of piping in the new steam and bottling plants of the Frank Fehr Brewing Company, Louisville, Ky. All lines, down to 1/2", are fabricated with Tube-Turn welding fittings. That means there are no shutdowns due to joint failures, no expensive losses of pressure and product.

The piping has minimum frictional resistance to flow, saves space, and is completely trust-

worthy. The insulation was easily and quickly applied to the steam lines, and, of course, does not have to be removed to get at leaks, because none develop. The installation records of Charles A. Schott, Fehr's efficiency-minded chief engineer, show that the cost of the firm's long-lived welded piping was no more than would have been entailed had screwed connections been used. And his maintenance problems have vanished.

*Courtesy, Tube Turns, Inc.*



# FREE



From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

**I**F YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

**28 PAGES**  
of helpful facts to  
know about  
**COTTRELL**  
**ELECTRICAL**  
**PRECIPITATORS**



### Packed with helpful COTTRELL Information:

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- Basic types of Cottrell Electric Precipitators.
- Principal parts of a Cottrell Precipitator.
- Mechanical and Electronic Rectifiers.
- Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).
- Removal of Collected Material.
- Factors in Shell Construction (steel, concrete, brick, etc.).
- Operating Efficiencies and the Effect of Various Factors on Performance.

... and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

### NOW SELLING



in all parts of the U. S. A. and foreign countries.

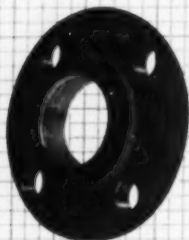
SOUTHERN POWER & INDUSTRY for MAY, 1950

**WESTERN**  
**Precipitation**  
**CORPORATION**

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIAL FROM GASES & VAPORS

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## Boiler Automatic Control and Instruments

**M**OST plants are equipped with some sort of automatic control, and the size of the ultimate operating force is largely determined by the amount of automatic equipment provided. Because of this, the force is usually insufficient safely to operate on hand control, especially when indicating and recording instruments are not installed.

The automatic equipment and instruments should, whenever possible, be scheduled for completion at the same time as the equipment

they are designed to control. For boilers the items in order of their importance are as follows:

- Boiler pressure gauges
- Feedwater pressure gauges
- Draft gauges
- Feedwater regulating valves
- Steam flow meters
- Feedwater flow meters
- Remote water level indicators
- Combustion control
- Master control

JOSEPH H. DRAKE  
Reynolds, Smith & Hills  
Jacksonville, Fla.

## Boiler Walls

**O**NCE upon a time ages ago somebody built a boiler wall with expansion joints in the corners. This simply meant that the walls were built of four slabs with no attempt whatsoever of taking advantage of the strength and stability of an angular corner.

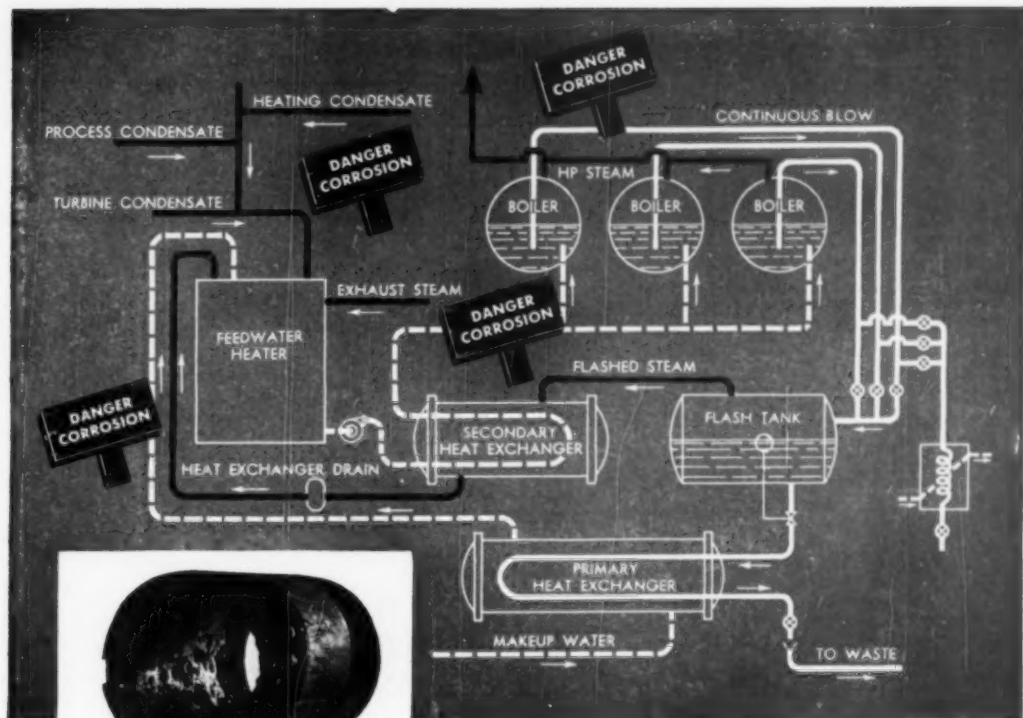
There isn't a building code in any city of the United States which would permit this type of a construction for any building. The earliest builders of log cabins tied their building corners together. Every boiler wall must withstand strains equaled only by buildings subject to cyclones and earthquakes. Why don't we build substantial self supporting walls?

A boiler setting is buckstayed, mostly vertically against the walls moving outward, but the common practice is for a wall to move inward.

In my thirty years of experience in building boiler settings, I have never heard of a satisfactory reason why a boiler setting must be left open at the corners.

GEORGE REINTJES





## AVOID These Danger Signs with BIRD-ARCHER Amine Treatment

CORRODED condensate return lines lead to expensive pipe replacement and maintenance. As an added annoyance, the solid products of corrosion often plug return lines and fill traps. You can steer clear of these troubles by using the *effective, economical* Bird-Archer Amine Treatment.

### HERE'S THE WAY THIS B-A TREATMENT WORKS

Amines are fed into the boiler or into the steam and condensate systems. The amines raise the pH value of the condensate and also tend to inhibit equipment-destroying corrosion through sur-

face protection of the metal itself.

### HERE'S HOW THIS B-A TREATMENT SAVES MONEY

Raising the pH value of the condensate severely decreases maintenance costs by eliminating corrosion. These savings may more than offset the amount of treatment required to provide protection for your equipment.

**NEW BULLETIN** gives full details on the Bird-Archer Amine Treatment. . . contains case histories that prove its successful application in many plants. *Write for your copy today.*

BA-154

### WHAT AMINES ARE

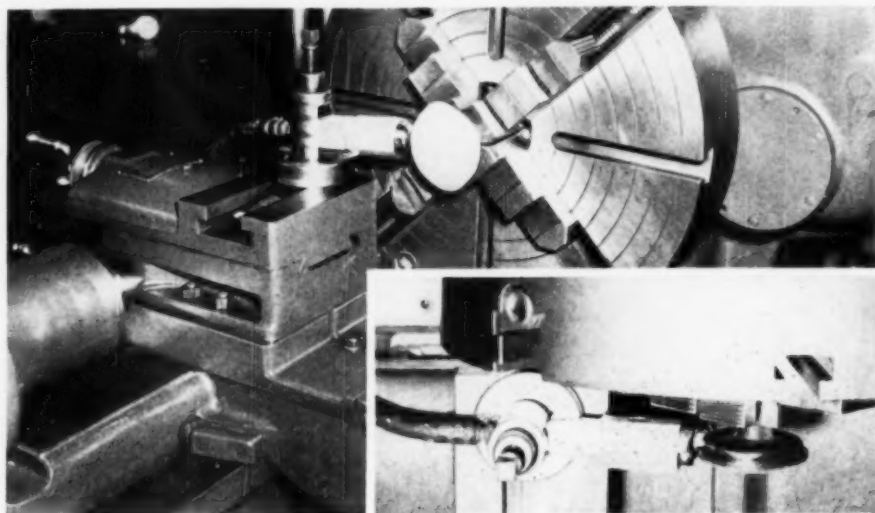
Amines are members of a class of chemical compounds in which one or more hydrogen atoms of the ammonia molecule are substituted by an organic group. Some of the simpler types are soluble and volatilize from boiler waters. The alkalinity of the amines is an inherent property and does not result from decomposition. *No free ammonia is released.* In the concentrations necessary for protection of condensate systems, amines are harmless to non-ferrous metals, non-toxic and are completely stable at temperatures approximating 675°F.

## BIRD-ARCHER WATER TREATMENT

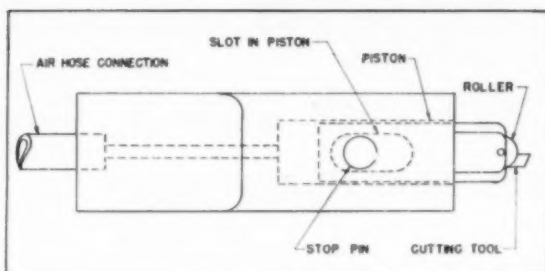


THE BIRD-ARCHER COMPANY, 400 MADISON AVE., NEW YORK 17, N. Y.  
Philadelphia, Pennsylvania • Chicago, Illinois • Montreal, Canada  
CALDERAS Y ACCESORIOS, S. A. AMSTERDAM 291, MEXICO, D. F.





THIS PICTURE SHOWS THE CAP CHUCKED IN THE LATHE AND THE FACING TOOL INSTALLED IN THE POST HOLDER. THE NON-CIRCULAR SHAPE OF THE CAP AND RELATION OF THE TOOL TO THE CAP MAY BE CLEARLY SEEN IN THIS VIEW. THE INSET PHOTOGRAPH SHOWS THE CONTOUR FOLLOWER ROLLER AND CUTTING TOOL AND THEIR POSITION RELATIVE TO THE CAP, AS SEEN FROM ABOVE. THE DRAWING GIVES SOME DETAILS OF CONSTRUCTION.



## Handhole Cap Facing Tool

**I**N order to machine the face of non-circular boiler handhole caps, a special tool was devised and built at Plant Mitchell. With this tool, which requires very little set-up time, caps can be accurately faced within a few minutes using an ordinary engine lathe.

### Tool Design and Operation

The tool consists of a cutting tool and contour follower roller

mounted in a piston which moves back and forth in the tool body.

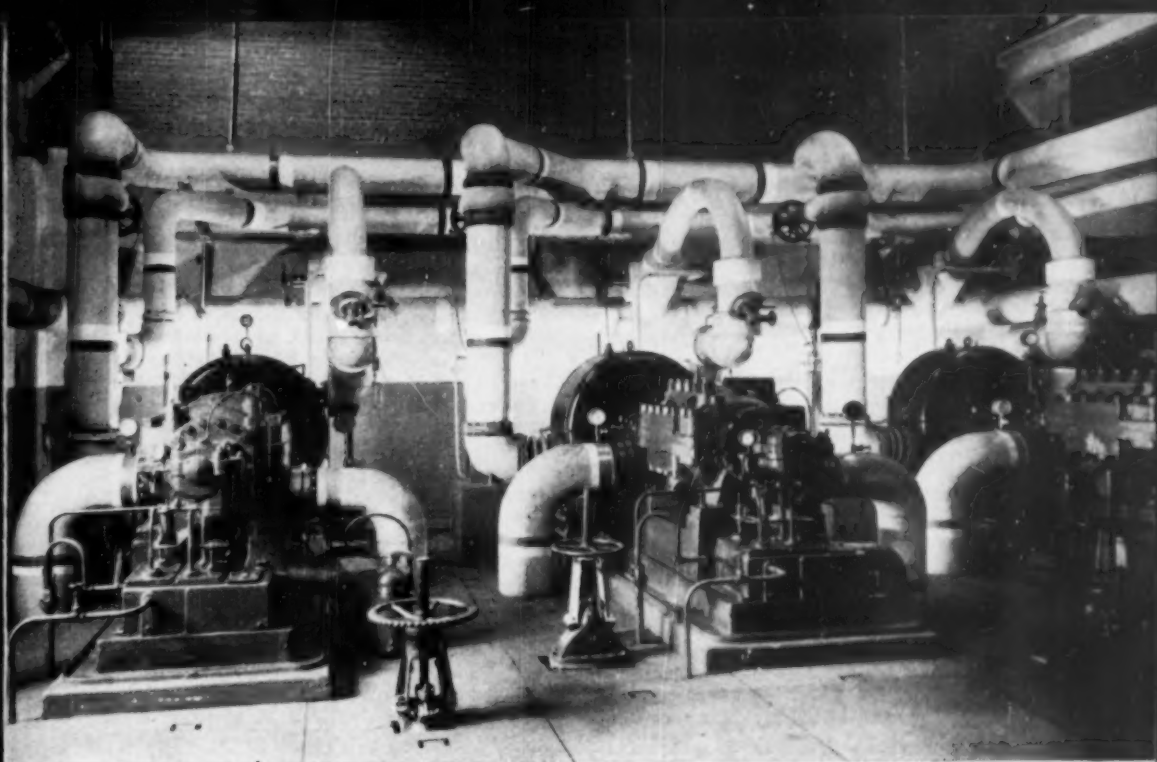
Compressed air, at about 100 psi, forces the piston against the handhole cap, and as the cap rotates, the roller causes the tool to take a constant depth cut from the cap edge.

The facing tool was constructed of cold rolled steel and the roller and roller pin were surface hardened to reduce the rate of wear.

Caps should not be turned down beyond a predetermined thickness to avoid the danger of failure in service. Generally the facing tool is used to smooth up cap faces only where a negligible amount of metal is removed.

The accompanying sketch shows the construction of the facing tool and the photographs show the method of set-up and usage.

C. A. Cox, Georgia Power Co.



## GETTING BIG POWER AROUND CORNERS

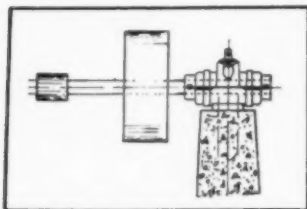
**T**HE SOLUTION of tough power piping problems—carrying big power around tight corners and through difficult situations—is a specialty with Power Piping Division. The enviable records of Blaw-Knox piping installations are explained only by the long experience of Blaw-Knox engineers, the skill and equipment available for handling complicated piping assemblies of all sizes in Blaw-Knox shops, and the excellent training and close supervision of Blaw-Knox field installation crews.

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OF BLAW-KNOX CONSTRUCTION CO.  
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# BLAW-KNOX *Power-Piping*

## Shafting Kinks

**W**ITHOUT giving much thought to the matter many users of pulleys and shafts install pulleys incorrectly in the manner as shown in the accompanying sketch.



What is wrong with it? The pulley is too far away from the bearing. It could be moved over on the shaft toward the right a considerable distance where it would receive more rigid support.

When a pulley is not located near a supporting bearing it is obvious that, when the belt is placed on the pulley and when the drive is fully loaded, the shaft will be deflected more or less, the amount of deflection depending on the tension in the belt and the strength of the shaft. A stronger and more costly shaft will be necessary to hold the pulley in alignment when in the position shown than would be necessary if the pulley were closer to the bearing.

Pulley position like this, and shaft weakness, are commonly the cause of sufficient misalignment of the pulley to cause the belt to jump off the pulley continually—and the operator wonders why. He stops the machinery, checks the alignment, and finds everything to be OK. The pulley is in alignment when the belt is off and not pulling, but it can be badly out of alignment when under full load.

By using a ball bearing instead of a plain bearing you can place the pulley still closer to the center of the bearing and thus use a shaft that is even smaller and therefore less costly. The distance from the "center of the bearing" to the "center of the pulley" is the distance that counts. Make that distance as short as practicable.

## Battery Charging Circuit

**A** SIMPLE control relay can be substituted for a battery cut-out when the accompanying circuit is used, and when a motor generator set is used for charging.

### Design

The relay must have two contacts, one normally-open (BV2), and the other normally-closed (BV1). The relay coil must have the same dc voltage rating as the battery. For a 120-volt station battery, a 125-volt coil is used. Fuses, F1, and F2, must be of such value as to withstand the maximum closing current without opening, and the cables from the battery to the fuses and from the fuses to the switchgear must be of such size as to keep down voltage drop to a minimum.

### Battery Charging Circuit Operation

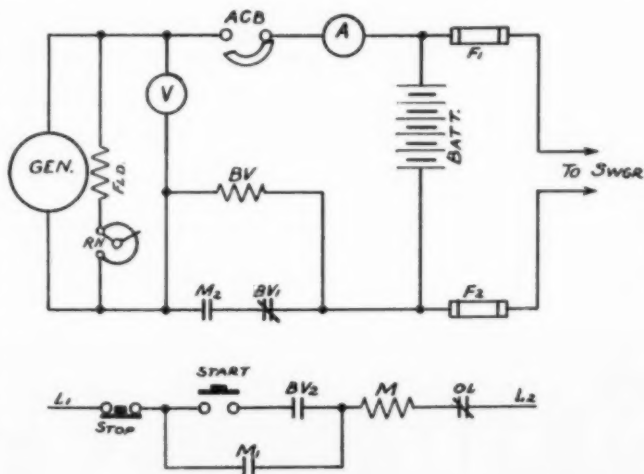
The relay in this scheme is used on the balanced voltage principle. When generator voltage and battery voltage are equal, relay coil BV is de-energized, whether contacts M2 and BV1 are closed or not. In order to start the motor-generator set, air circuit breaker ACB must be closed. In this way, BV is energized through the breaker and generator, which closes con-

tact BV2 allowing the motor "start" circuit to be completed. When the motor starter closes, it seals itself in the usual manner through M1, and at the same time, M2 closes, but the charging circuit is not complete since BV1 is open due to the voltage across BV. However, as the generator voltage builds up, the voltage across BV decreases.

The relay spring can be given a very weak setting and thus cause the relay to drop out at a very low voltage which means that generator voltage and battery voltage are almost equal. When BV drops out, BV1 closes, throwing battery on charge. When stop button is depressed or when motor fails due to overload, power failure, etc., starter coil M becomes de-energized and M2 opens, breaking the charging circuit. At this point, the voltage across BV is still very low. However, as the generator decelerates, the voltage across BV increases until pickup value is reached, and BV1 opens.

Although BV will not take the battery off the generator on a small amount of reverse current, the ammeter, A, will indicate such a condition in time for it to be remedied.

R. H. LANGFORD (N. C.)



# SPECIFY ERNST Water Columns • Liquid Level Gages

BRONZE, FORGED STEEL, ALL IRON • FOR ALL PRESSURES AND TEMPERATURES  
FOR BOILERS, TANKS, REFINERY SERVICE, ETC.



Fig. 5

Standard vertical bronze water gage, 330 pound design, heavier construction up to 450 lbs. Stainless and forged steel for higher pressures.



Fig. 6

All iron gages for pressure up to 250 lbs., heavier construction up to 350 lbs.  
Fig. 855—Same fittings made in stainless steel.

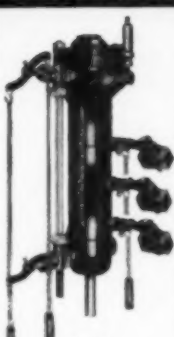


Fig. 83

No. 5 high and low alarm column with vertical gages and DCP weighted type try cocks.

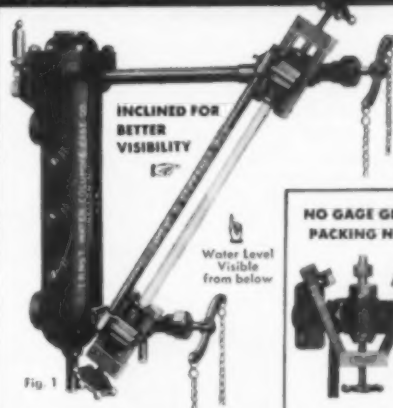


Fig. 1

DESIGNED FOR  
250-450-650 LBS. W.S.P.

High and Low Alarm Column Equipped with Split-Gland Type Adjustable Inclined Water Gage

NO GAGE GLASS  
PACKING NUTS



Simple and easy to install a gage glass. No wrenches or tools required. A turn of the hand wheel compresses the packing.

Wire or  
Phone  
Ernst

## Insure Safety with ERNST INSERTS

Mica-protected Flat Glass and PRISMATIC REFLEX



Fig. 45  
Ernst thru Vision  
Mica-Protected  
Single Insert



Fig. 55

Ernst thru Vision "Doublevision" Overlapping Insert



Fig. 37

Prismatic Reflex Steam Shows WHITE; Water shows BLACK



Fig. 10  
Plain Sight  
Illuminator



Fig. 31  
Ernst Plastic Guard,  
Replaceable Plates

## ERNST LEAKLESS TRY COCKS

Designed for 450-650-1500  
2500 lbs.



Fig. 13

Ernst Leakless Try Cocks Assure Maximum Safety



Fig. 01

Bronze, with Wheel

## Weighted Type Try Cock

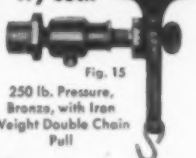


Fig. 15

250 lb. Pressure, Bronze, with Iron Weight Double Chain Pull



Spring Type  
Fig. A5-250

## SIGHT FLOW INDICATORS for insertion into pipelines

"See what's going on" . . . inside



Fig. 17-28  
Tubular Glass Type



Fig. E-811  
Flapper Type



Fig. E-57  
Bulls Eye Type  
Double Window

Write  
Ernst

## GAGE GLASSES—Tubular and Flat Type



FLAT TYPE REFLEX  
AND CLEAR

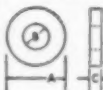


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## High Pressure Composition RUBBER GASKETS

Manufactured in all sizes to fit your water gages



Specify:  
B—Inside  
Diameter  
A—Outside  
Diameter  
C—Thickness



Fig. 21—Lip Mold  
Rubber Gasket



Fig. 22—Standard  
Rubber Gasket

# ERNST WATER COLUMN & GAGE CO.

Main Office and Works: 250 South Livingston Avenue, Livingston, N. J. • Phone: Livingston 6-1400

### **Bearing Failures on Oven Conveyor Stopped**

**B**URNED out conveyor bearings and grease dripping on freshly painted electrical equipment were two major drying oven problems confronting engineers of one manufacturing plant.

At a temperature of 375 F, the best organic greases failed and weekly relubrication was essential to keep the conveyor system operating. Even then bearing failures were common.



Acting upon the advice of a Dow Corning sales engineer, the plant engineer cleaned and replaced the conveyor bearings with DC 41 Silicone Grease. Now, after more than two years of silicone lubrication, bearing failures are unknown. Relubrication twice yearly is all that is required to keep the conveyor working perfectly.

### **Maintenance of Shafting**

**I**N many plants it is customary to throw away shafting that has worn badly at the bearings or

that has become scored as the result of a hanger box burning up. Actually, this wear or scoring at one or two points does not weaken the shafting to any extent, and it can be made serviceable with no more effort than would be required for installation of new shafting, and with no expense for new shafting.

It is simply necessary to remove the shafting from its hangers and turn it end on end. Then, new shaft area is presented to the bearings and the shaft is as good as new. If the shaft is scored that is an indi-

cation that the bearing surface in the hanger boxes is also scored, and new bearing surfaces should be provided in the boxes.

Sometimes it is easier to accomplish the same purpose by switching positions of two pieces of shafting in the same line that are of different length. This will present new shaft surfaces to all bearings along the line. The mechanic making the change should first make sure that the shaft coupling in the new position will not interfere with a pulley.

LESLIE ARKWRIGHT (S. C.)

### **Welder's Skill Salvages 2-Ton Crankcase**

**U**SING an improvised preheat arrangement consisting of a large floodlight left in the casting overnight, a welder accomplished a spectacular reconstruction job on a 300-hp Diesel engine casting, which had been shattered by a broken bolt driven through it by the crankshaft. The casting consisted of a two-ton crankcase 10' in length.

As may be seen in the illustration, the repair involved aligning the ruptured sections by passing a threaded rod along the oil sump channel and pulling the broken edges together—a noteworthy feat in itself, since the heavy casing walls averaged 1" in thickness.

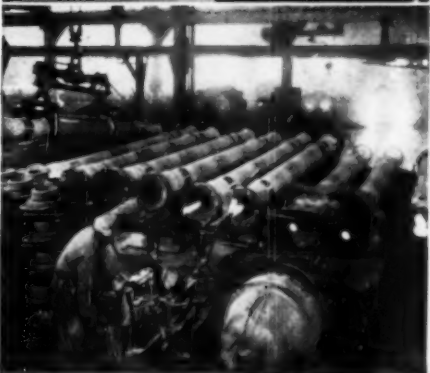
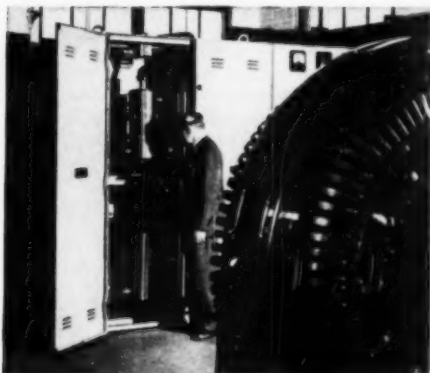
The entire welding operation required 48 hours. A special  $\frac{1}{8}$ " alloy rod for cast iron known as "EutecTrode" 24 was used to avoid excessive fusion and heat absorption by the casting, and great numbers of passes were made, consuming a total of 30 lb of rod. Welds were made both inside and outside, to restore the oil channel.





# \$30,000 back in 5 years

The 500-kw, 250-volt G-E rectifier at the Florence Pipe Foundry and Machine Company requires only periodic inspection.



The G-E rectifier provides the d-c power which operates the cranes, ladles, and centrifugal casting machinery in the Florence Company's plant.

## Florence Pipe Foundry & Machine Company

### GETS LOW-COST D-C POWER WITH G-E RECTIFIERS

When the Florence Pipe Foundry & Machine Company needed additional d-c power in 1946, George E. Pfeffer, electrical engineer, looked for the best way to do the job. He learned that installing G-E rectifiers would save in three ways:

**1. Installation costs—\$10,000 less**

The rectifiers were compact enough to fit into the present power house. Other types of generating equipment required the construction of a costly new building.

**2. Operating costs—no new personnel needed**

Because rectifiers need only periodic inspection, there's no need for standby personnel.

**3. Power costs—\$600 a year less**

The extra high efficiency of G-E sealed rectifiers saves about \$600 a year in power bills.

The combined savings will amount to \$30,000 in five years. That will pay for the rectifiers, and for the cost of installing them.

#### To Cut your Power Costs

Find out today how you can put G-E power rectifiers to work in your plant. Call or write your nearest G-E sales office for information. **Apparatus Department, General Electric Company, Schenectady, N. Y.**

G-E MERCURY-ARC RECTIFIERS MEAN LOW-COST D-C POWER

GENERAL  ELECTRIC

## Cleaning Motor Windings

**A**BOUT the best way to clean electric motor windings is to take them outside the plant and spray with a paint sprayer, using white gasoline as the cleaning solvent. White gasoline is any gasoline which does not contain tetraethyl lead. Amoco, a high test gas sold by American Oil Co. is one of the few white gases sold in this part of the country, but any pure gasoline would do equally as well for cleaning purposes. Naturally, the mechanic must remember that gasoline is a dangerous volatile and demands care in use.

After the windings have been sprayed thoroughly, blow the motor with compressed air, and then dry it thoroughly by placing it in front of a unit heater. When dry, the windings should be painted with a good insulating varnish.

A unit heater with about 80 psi steam is very effective in drying wet motors or for baking out varnish when no oven is available. The motor is simply placed on a table in front of the heater and allowed to dry. We have used this method many times and have had good results.

LESTER ALBRIGHT (N. C.)

## Sealing Door Against Rain

**W**HEN a rolling door in our plant started leaking water because it was not tight enough to the floor, we bolted a strip of foam rubber to the bottom and it not only stopped the water from coming in, but stopped the noise of the door hitting the floor.

L. B. MCGEE (GA.)

## Test Hook-Up for Atomizers

**I**T is necessary that atomizers be cleaned and checked from time to time, for dirt from water and air lines is bound to accumulate after a period of operation. Even when filters are used on both the air and water lines leading to atomizers, a little gets through to

throw the air-water ratio out of balance. Also, the rubber or synthetic valve seats in the water valves tend to swell and change the atomizer adjustment slightly.

It is the job of the maintenance department to keep these atomizers in good condition, but when they are removed for cleaning, it is difficult to correctly reset them so that the proper output of moisture is obtained when reinstalled. Recognizing his problem, the engineers of the Bahnson Company and Fisher & Porter Company have worked out a hook-up, which can be easily installed in any maintenance shop, to test atomizer output after cleaning. Using this equipment, any adjustable atomizer may be accurately adjusted before putting it back on the job.

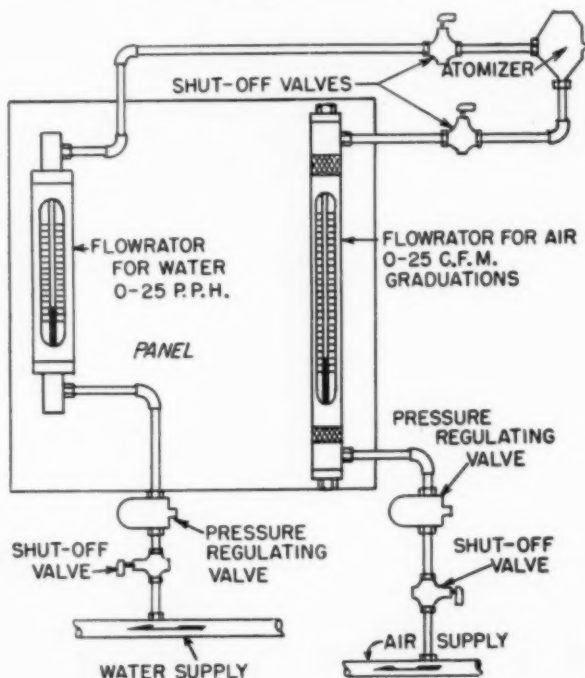
The hook-up consists of two Flowrators, one for air and one for water, mounted side by side on a panel. The lower connection of each Flowrator is connected to its air or water supply through a pres-

sure regulating valve and a shut-off valve. Tubing leads from the top of each Flowrator to any spot where an atomizer may be conveniently connected. There should be a shut off valve in each of these lines.

The atomizer to be tested is placed in position and connected to the upper tubes leading from the Flowrators. All shut-off valves are then opened, and the delivery of air and water read from the Flowrators. Atomizers are then adjusted until the proper amount and ratio of air and water output is achieved.

Since the atomizer will be in operation when being tested, the test unit should be placed so that the spray from the atomizer will blow out a window or into a drum or in a direction where the moisture will do no harm to surrounding equipment.

Flowrators may be obtained from Fisher & Porter Company, Hatboro, Pa.



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elevating problem — specify

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BELT CONVEYORS, SCREW CONVEYORS, APRON CONVEYORS, BUCKET ELEVATORS  
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**CONTINENTAL GIN COMPANY**

BIRMINGHAM, ALABAMA

ENGINEERS



ATLANTA • DALLAS • MEMPHIS • NEW YORK



MANUFACTURERS

### Quick Change Coupling Plates

**O**UR plant has a large number of motor drives with flexible couplings.

When any repair or replacement had to be made on one of the couplings it required the work to pull the coupling out and find one to fit the shaft and the driving studs; most of the time we had either to bore one out, cut a new keyway or bush one to fit.

We have standardized all the couplings to a renewable steel flange. The original coupling flange is turned down on a mandrel to fit the new steel plate which is fastened with six  $\frac{3}{8}$ " cap screws. Three holes are provided in the adapter plate to fit standardized drive studs. All the flanges are now the same and any replacement takes only a few minutes.

CHAS. LABBE

### Back-Firing on Oxy-Acetylene Welding Torch

**W**ELDERS from time to time may be troubled by a series of "pops," sharp reports, or back-firing of a welding torch. Usually it results from the following causes: (1) Molten metal forming on the tip, or by the welder allowing the torch to touch the surface of the metal. (2) Loose internal, and external nozzles, or dirt on the nozzle seat.

Back-firing of an Oxy-acetylene torch from either cause may be easily remedied. A simple way to eliminate the difficulty if resulting from cause No. 1 is to close the acetylene needle, allowing the oxygen to clear the passage. If this fails close both the oxygen, and acetylene needle valves, and cool the torch by plunging it in water, after which it may be immediately relighted.

To eliminate the "pops" etc., if caused by loose nozzles, or dirt on

nozzle seat, simply tighten the nozzles, and clean the seat thoroughly. So-called "back-firing" of the Oxy-acetylene torch usually is only a series of sharp reports, and

will not "snuff" the flame on the torch. However, if neglected, it may require frequent relighting of the torch and thus delay the welding job.

### Ball Bearings for Old Electric Motors

**T**HERE have been a number of instances recently where old motors in our plant have given us trouble because of worn and inadequate bearings. Both the shafts and the bearings are frequently in such bad shape that we had first decided to discard the motors and replace them with new ones.

We then learned that it is possible to install ball bearings on such motors and greatly extend their life; at the same time reducing friction losses below that of a new sleeve bearing motor. A number of companies make special ball bearing cartridges suited to the job.

When the bearing cartridges are purchased, they should be for a shaft  $\frac{1}{16}$  in. smaller in diameter than the present shaft in the motor. Then, the shaft is turned down  $\frac{1}{16}$  in. to fit the bearing. This is done in order to assure a good fit, and a new bearing will not properly fit an old, worn shaft. Of course, if the shaft is badly worn, it will not be necessary to take a full  $\frac{1}{16}$  in. off, but a good fit between the shaft and the inner race is necessary.

One of the end shields of the motor is then chucked in a lathe and trued with the machined sur-

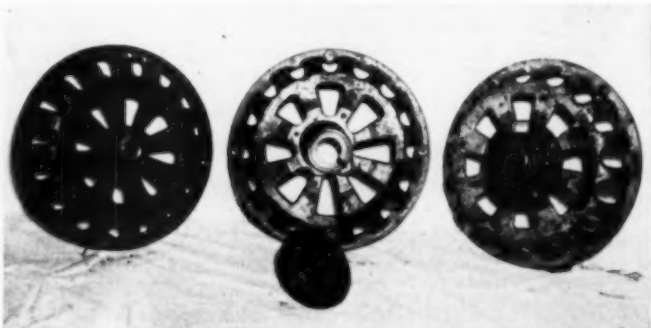
face that fits against the stator. The whole extension containing the oil reservoir is turned off. This makes a seat for the flange of the ball bearing cartridge. The photograph shows this clearly. The first end shield on the left is just as it was removed from the old motor. The shield in the center has had the oil reservoir turned off. In front of it is shown a ball bearing cartridge, and on the right is the new assembly.

After the oil reservoir has been turned off, the shield is bored to the diameter of the boss on the ball bearing cartridge. The cartridge is then bolted to the shield.

After the bearing cartridges have been fitted to both end shields the motor is reassembled. However, it is wise to start the motor several times before locking the inner races to the shaft. Starting the motor will permit the rotor to seek its magnetic center, and only after it has settled in this position should the races be locked.

We have converted a great many of our motors in this manner, and they have all given excellent service. After the first few jobs, it will be found that it is a quick and easy affair.

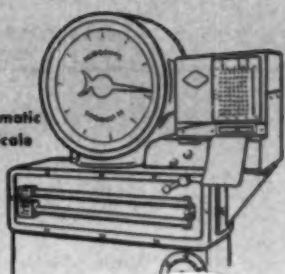
LANIER ALLISON (S. C.)



Bench  
Scale



Printomatic  
Dial Scale



Portable  
Dial Scale



## The easy WAY to *WEIGH* **FAIRBANKS-MORSE Scales**

Fast, accurate, easy-to-read, easy-to-handle Fairbanks-Morse Scales offer the easy way to "weigh." Because these lastingly accurate weighing instruments are designed for fast, dependable operation . . . for maximum ease of reading, they speed weighing operations . . . minimize the chance of costly human error.

There is a Fairbanks-Morse Scale for every weighing operation. Your Fairbanks-Morse weighing expert will be glad to assist you in selecting the right style and size for your operations. Fairbanks, Morse & Co., Chicago 5, Ill.

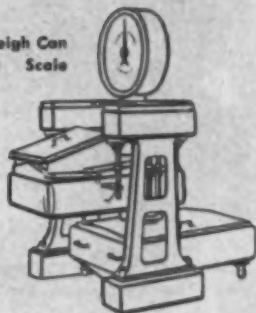


## **FAIRBANKS-MORSE**

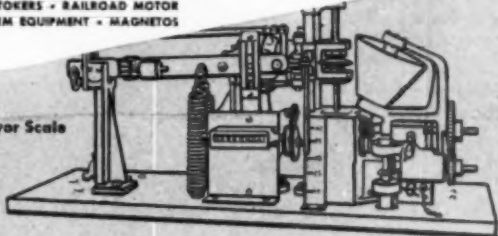
**A name worth remembering**

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES  
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR  
CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS

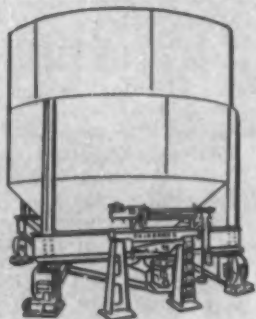
Weigh Can  
Scale



Belt Conveyor Scale



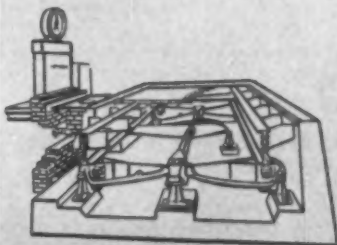
Hopper Scale



Full Capacity Beam



Counting  
Scale



Truck Scale



### The Use of Loop Systems

**L**OOP systems are infinitely preferable to straight-line-and take-off systems for piping of all sorts. Loops permit the isolation of any one piece of equipment and provide an alternative feed in case of trouble at any point. Loops cut down the number of outages of equipment to a marked degree, and permit easy maintenance, packing, cleaning, and adjustments.

From the operators viewpoint they are well worth the extra cost, and probably pay for themselves many times over during a period of years. Where the law permits, a single boiler feed loop system can be substituted for a main and auxiliary feed system.

JOSEPH H. DRAKE (FLA.)

### Saves Utilities Thousands of Maintenance Dollars

**T**HIS tip from a large utility company can greatly reduce maintenance costs on pole top disconnect switches. A thin coating of DC 4 Silicone Compound assures positive and easy operation of disconnect switches by preventing oxidation. It is also used to prevent oxidation of the metal and to lubricate switch clips, hinges, jumper cables and switch bearings exposed to all kinds of weather.

Between the power-house and the consumer, there are dozens of places where this Dow Corning Silicone Compound is used as an auxiliary dielectric, as a waterproof seal and as an oxidation resistant lubricant that does not harden or melt at temperatures from -67 to 400 F. For example, a coating of this inert silicone compound lubricates and protects rubber and plastic covered cable from weathering, corona cutting, and corrosive atmospheres. Voids in splicing of ACSR Cables are filled with DC 4 to prevent oxidation and to improve the conductivity of the splice. It prevents corrosion of the contacts and screws in type S watt-hour meters and serves as a permanent non-thinning lubricant in water meter gear trains.

### Slurry Tank Installation Saves for Oil Mill

**A** SLURRY tank recently installed in our solvent process cottonseed oil extraction plant saves several thousand dollars for our company and should be of interest to others that use centrifuges in their plant processes.

My reason for installing the slurry tank was to reclaim some of the oil in the solids separated by the centrifuge.

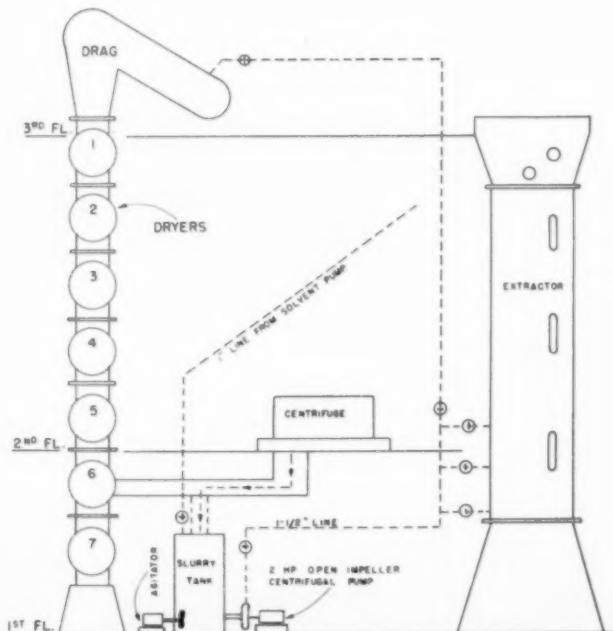
The centrifuge is the first step in our clarification set-up. The miscella (mixture of oil and hexane) is first centrifuged to remove the heaviest or coarsest fines. The liquid goes to a miscella tank directly below the centrifuge. And in the original arrangement, the fine meal from the centrifuge went to a conveyor and was introduced into the main meal stream at the No. 6 dryer. These fines from the centrifuge contain about 17% oil and represent about 12% by volume of the total meal produced. Obviously, this fairly large volume of high oil content meal being re-

turned to the system at the No. 6 dryer tended to raise the average oil content of the final meal produced. Whereas, returning this high-oil meal to an earlier stage of the separation process would permit recovery of this excess oil, and thereby reduce the oil content of the final product.

After installing the slurry tank as shown in the accompanying sketch, the fines from the centrifuge go directly to this tank where hot solvent is continually introduced and agitation is provided. The slurry from the new tank is now pumped back to the extractor or to the drag, whichever is most desirable.

We find that by sending the slurry back to the extractor as now arranged, the residual oil left in the finished meal is lowered by a full 0.50%.

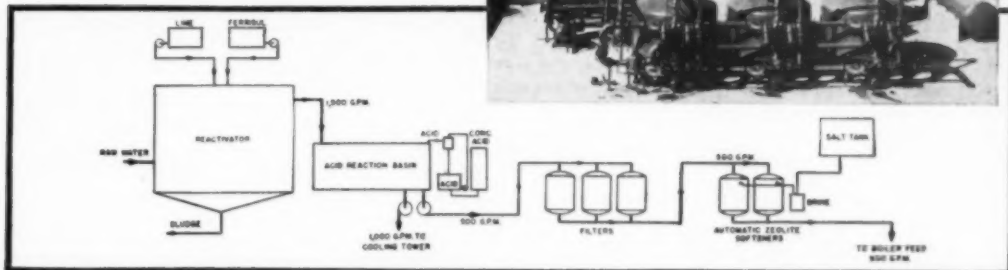
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Solvent Plant Supt.  
Osceola Products Co.  
Osceola, Ark.



**How Tide Water Oil Uses**

# GRAVER

## FOR COMPLETE WATER TREATMENT



At Tide Water Oil Company's Avon, California, refinery a turbid hard water supply is completely conditioned for boiler feed and cooling water services by Graver equipment consisting of Reactivator, Acid Feeding System, Anthrafil Filters and Automatic Zeolite Softeners as shown in the flow chart above. The raw surface water, with an inlet turbidity of 250 ppm, is first treated with lime and ferric sulfate in the Graver Reactivator. Here, partial reduction of hardness takes place while the turbidity is reduced to 3-5 ppm.

The Graver Acid Feeding System continuously and automatically proportions acid to the Reactivator effluent to reduce the alkalinity and to correct the pH to the desired value. Part of the water is thus conditioned for the cooling water system. The remainder of the water is filtered in the Graver Anthrafil Filter and softened to zero hardness in the Graver Zeolite Softener for use as boiler feedwater.

The completeness of GRAVER service on this job is further accentuated by the facts that GRAVER:

1. recommended to the Engineers the most effective type of equipment for their requirements.
2. built all the major component parts of each Water Treating Unit in its own shops.
3. furnished all needed accessories.
4. supervised the installation of the equipment.

This single responsibility assures satisfactory operation of every GRAVER installation.

For best results in solving your water treatment problem, get the benefit of GRAVER'S 40 years of specialized experience, proven designs, and unequalled facilities. Be sure to ask for GRAVER recommendations.

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**GRAVER**

A DIVISION OF GRAVER TANK & MFG. CO. INC. EAST CHICAGO, IND.

GW-418

## The Use of Spectrographic Analysis in Diesel Engine Maintenance

ONE of the expensive items in diesel engine maintenance is main crankshaft bearings. If the engine is taken out of service more often than is necessary for inspection of bearings, the lost time from operation is expensive. If the engine is allowed to remain in service so long that the bearings break down, the replacement or refinishing of the bearings is very expensive. Hence it is very desirable to have a means of determining the optimum time for inspection. Spectrographic analysis provides a means for doing this.

A 20 gram sample of the diesel lubricating oil is taken at intervals of approximately 100 hours of operation. The sample is burned and the ash analyzed for metal content. The results are expressed in parts of metal per million parts of oil. When the oil is found to contain unusual amounts of the metal from the bearings, it is time for inspection and adjustment. If, for example, the main bearings are made of silver, the silver content of the oil is an item of primary interest. Silver cannot be detected in good quality unused oil. The spectrograph makes it readily possible to detect as little as one part of silver for one hundred million parts of oil. When a sample of used oil is found to contain as much as one part of silver per million parts of oil, it is time to inspect for excessive wear, and to make the necessary adjustments to prevent a breakdown.

The laboratory of the Industrial Research Institute of the University of Chattanooga has been making such analyses as described above for the Southern Railway System for the past two years.

## Testing for Short Circuits

WHERE there are a number of small tools operating from a single 110 v circuit, perhaps a

number of these small tools on extension cords, it is sometimes difficult to tell which one of several individual circuits or tools is the offender in case of a short circuit.

Where only one of the two fuses is blown, it is probable that somewhere on the entire circuit there is a short to ground. To find just which one of the individual circuits or tools is shorted, simply screw a lamp bulb into the socket of the blown fuse. As long as the short continues, the lamp will burn. With the lamp in place, it is a simple procedure to go down the

line and disconnect each appliance one after the other. As soon as the offending extension cord, or individual circuit is pulled, the lamp will go out. Then of course repairs can be made as necessary and the fuse replaced.

The above procedure will not work, however, if there should be a short between the two live wires of the circuit, instead of a short to ground. In this case, both fuses would be blown, and the procedure described above would not be applicable.

R. C. McNICOLL (LA.)

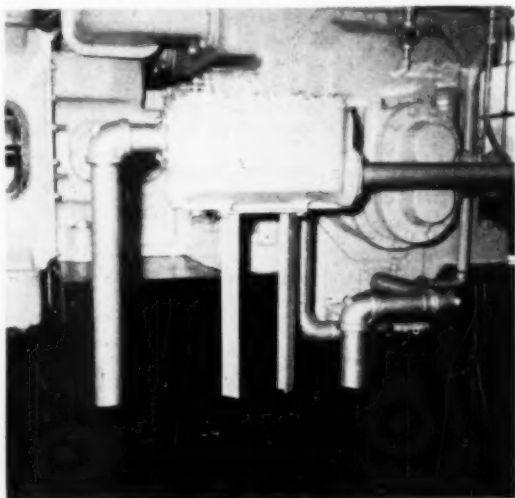
## Oil Filter Stand

THE oil filter unit is customarily set on or near the floor at the gear end of the engine, and in that position it is necessary for the engineer or his assistant to stoop to turn the handles which operate the cleaner.

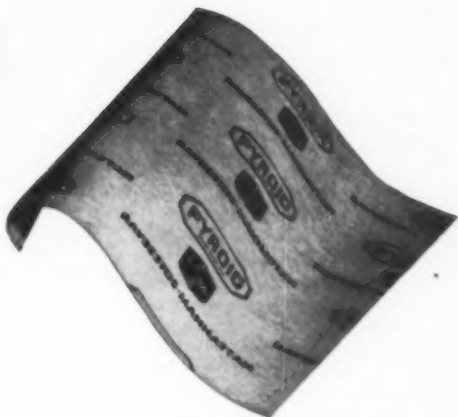
By raising the filter unit on a simple stand, formed from two heavy angles and top and bottom plates large enough to match the base of the filter, the chief engineer brought the operating handles up to a point where they were conveniently at hand as the operator walked around the engine. The filters could be cleaned more readily

than in their former position—and experience with the elevated mounting soon showed that they were cleaned more often than before.

Clogged filters were practically eliminated by the shift, and by-passing the filter while a unit was cleared was eliminated. Where formerly it was not unusual to have as many as three or more of the filters within the group inactive, after the change it was only very rarely that one of the sections would become inoperative due to material caught between the cleaning and screening elements.



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R/M "Pyroid" Compressed Asbestos Sheet Packing, No. 650, is the standard in thousands of power plants and refineries where it is called upon to resist high pressures and temperatures, and the solvent action of petroleum derivatives. A dense pliable sheet of exceptional tensile strength, "Pyroid" is made by one of America's largest manufacturers of sheet packing.

R/M No. 625 Red Rubber Sheet Packing is another widely used product. It is a tough, long-lasting resilient sheet, recommended for use against air, water, or steam at low pressures.

Other R/M sheets that have demonstrated their quality in service include R/M No. 670, a low-cost compressed asbestos sheet approved by the National Board of Fire Underwriters for use with gasoline, benzol, etc.; R/M No. 635, a Flexlastic C.I. sheet for cold water, low pressures, and general service; R/M No. 645, a diaphragm sheet of high-tensile square woven duck, covered with best grade Flexlastic and widely used in water, oil, air, and gas damper regulators. These and many others are manufactured by R/M to solve your gasket problems.



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### Ladder Rack and Lock

**T**HE maintenance of ladders about the industrial plant is always a difficult function, and particularly so where the normal tendency to use each others ladders is frequently permitted.

The small plant can manage reasonably well with one complete set of straight, step, and extension ladders since all the crafts usually function under one department head, probably the superintendent of construction and maintenance. But in a large departmentalized operation, usually the best plan is to equip each craft with the desired complement of ladders and scaffolds (trestles). Steel safety scaffolding however, because it is heavy and expensive, may be held at a central point where any craft may use it as their work requires.

Once the equipment is properly protected by the application of spar varnish or boiled linseed oil it should be legibly stenciled on both sides by name or number to identify department or ownership when found about the premises. A suitable ladder rack, and in some instances a locking arrangement facilitate the storage and safe keeping of each individual department's ladder equipment. Procedures should insure keeping the ladders clean and dry and stacked in a straight manner to prevent warping, twisting and sagging.

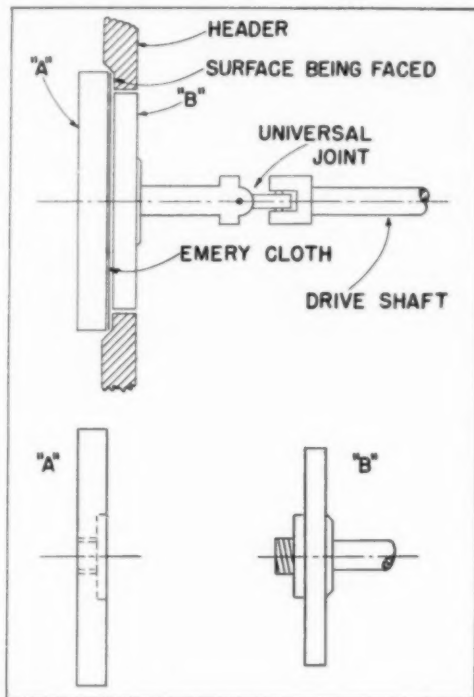
### Silicone Insulation Saved \$17,415

**E**NGINEERS increased the pumping capacity in a production unit of The Dow Chemical Company by having 12 of their old 50 and 60 hp motors rewound with Dow Corning Silicone (Class H) Insulation. New 75 hp class A motors would have cost them \$24,840 at list price; rewinding cost only \$7,425. At a saving of \$17,415, they got a line of class H motors that have much greater resistance to moisture, oil and corrosive atmos-

pheres, plus greater overload protection than was true of the original motors.

A recording ammeter chart released by Dow's engineers shows that one of these 50 hp Silicone insulated motors was subjected to

peak loads of 86.5 hp at frequent intervals during the past two years of service. Under such loads and temperatures, bearings might be expected to fail, but they prevented that by using DC 44 silicone grease.



**Polishing Tool for Handhole Seat**

**O**PON the initial start-up of Plant Mitchell, some difficulty with leaking boiler handhole caps was experienced. Even where both the handhole caps and seats were re-faced this condition persisted.

At that time, the consensus was that even though the handhole seats had been re-faced, sufficient defects remained from re-facing tool marks and other causes to be the source of trouble. It was proposed that a rotary tool be built, which would polish the handhole seat with an abrasive disc. Based on this idea, the master mechanic built a device similar to that shown in the accompanying sketch, which

when used to polish the handhole seats, resulted in a considerable reduction of handhole leaks.

The handhole seat polishing tool is preferably fabricated of steel and is powered by a portable electric drill. The abrasive disc is clamped between parts "A" and "B", which are screwed together. In practice, part "A" is inserted into the header through a master handhole, then moved to the handhole to be worked and attached to part "B", which is slightly less in diameter than the handhole and therefore acts as a guide.

F. M. STEWART, Georgia Power Co.



# Electric Truck Maintenance

## Reduced at Reynolds Tobacco Company

By C. E. Stephenson

Electrical Engineer  
R. J. Reynolds Tobacco Co.  
Winston-Salem, N. C.

**S**YSTEMATIC maintenance pays! When modern industry buys a piece of machinery, the costs and savings are carefully surveyed. The machinery is expected to operate regularly without delays caused by poor maintenance. It is sometimes surprising what intelligent, systematic maintenance can do in preventing costly breakdowns with accompanying expensive lost time. This is also true in regard to materials handling equipment, such as electric trucks.

### Maintenance Program

To set up a maintenance program for electric trucks, it is necessary to determine what and how often individual parts should be inspected, lubricated, and maintained. The manufacturer's recommendations should be studied and combined with operating experience in order that one simple system be established for several different types of electric trucks. After the schedule is determined, it should be made into chart form with dates indicating when the parts should be lubricated and inspected and with blank spaces to be filled in when these are actually done.

### Lubrication

Some parts should be greased or oiled weekly and other parts monthly. The trucks also should be inspected for needed repairs at the same time that this lubrication is done, so that repairs can be scheduled before failure occurs. If the types of oils and greases are used as recommended by the manufacturer, the parts will last longer and there will be less chance of leakage onto clean floors. The oil level in the transmission should be watched closely, because if this level should get too low, the gears may be permanently damaged. If

it is necessary to add oil to the transmission at frequent intervals, the oil seals should be checked. Faulty seals may cause a low oil level and may allow the oil to reach other vital parts, such as motor stators, with resulting damage.

### Battery Maintenance

It has been found that the cost of battery replacements can be reduced materially if the batteries are maintained correctly. The battery should be placed on 'equalizing' charge one day or night each week and necessary water can be added at the same time. At R. J. Reynolds Tobacco Company a night electrician does this on Thursday nights while the trucks are parked at the charging stations. The finishing rate of charge should be watched closely. If it is too high the battery will overheat and the life of the battery will thus be shortened.

The amount of water used by each battery should be recorded, without fail, because this gives a definite indication of the condition of the battery and charging equipment. If the water consumption increases, an investigation should be made at once to determine the cause. The water in the battery should never be allowed to reach a point where the plates are above the water level. However, water should be added only until the level is one quarter of an inch below the bottom of the filler plug. This prevents splashing of water and acid onto the top of the battery with resulting corrosion. The battery should be washed with soda and water as needed to remove dirt and possible corrosion.

### Contacts and Motor Brushes

Electrical contact life will be increased and lost time decreased if a small amount of oil or vaseline is applied weekly to the moving con-

tacts. This sounds simple but it is important. Badly burned or pitted contacts should be replaced with new contacts which should be adjusted to align with old contacts. When repairs are made to the truck, the motor brushes should be inspected and replaced if needed. It is false economy to try to make the motor brushes last too long because a short brush will cause arcing and serious damage to the motor armature.

### Overhaul

Occasionally the truck should be brought into the main repair shop for major overhauling. At this time all parts should be inspected and any worn parts should be repaired or replaced. The repair shop should be equipped with a chain hoist, preferably on a rolling overhead trolley, and with small tools, such as pulley and bearing pullers and socket wrenches. At R. J. Reynolds Tobacco Company it was found advantageous to combine all electrical and mechanical work, including lubrication and inspection, under the supervision of the electrical department. This prevents divided responsibility and makes it easier for the various manufacturing departments to get emergency repairs made if needed.

### Records

Each electric truck is assigned a permanent number. By means of repair orders, costs of repairs, inspection, and all materials used are charged to the truck on which the work is done. An adequate supply of spare parts is maintained in separate bins in the electrical department store room and the parts are charged out by number as used. The costs for each truck are accumulated monthly and yearly and filed by truck number. In this manner an accurate account can be made of the operating costs of each truck and a comparison can be made of the operating costs of different types of trucks.

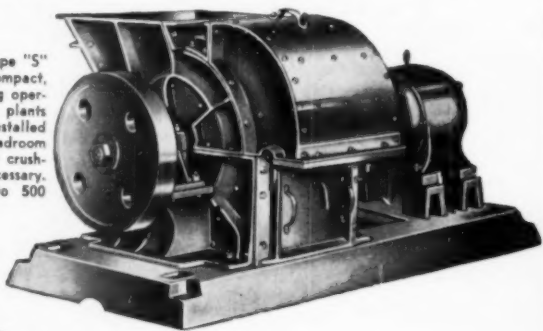
Electric trucks are usually bought to do a definite job, and if they are idle because of need for repairs, an extra expense is incurred. Systematic maintenance, well-trained mechanics, and good supervision will reduce expense to a minimum.

*Improved  
Combustion—  
Reduced  
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ROLLING RING  
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Send for the facts on efficiency of coal preparation in power plants with American Crushers.

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#### Cleaning Problem Solved

**P**ETROLEUM flushing oil accomplished a stubborn cleaning problem recently in three \$225,000 turbine generator sets in a southern mill.

After being used in a war plant, the three 5,000-kilowatt turbines were coated with a rust preventive material. When the turbines were being prepared for operation, initial attempts to clean the oiling system seemed fruitless because part of the rust preventive material was not removed. Deposits collected in spaces of small clearance, including the speed governor, made the turbines unreliable.

The turbines were flushed for six hours with "Sovalent A" (Socony-Vacuum), with a temperature maintained at 150 F. All traces of the rust preventive material were removed, and since then the three turbines have been performing satisfactorily.

#### Air Wrench Speeds Adjustment

**A** PNEUMATICALLY operated gun type wrench now hastens movement of the large 8500-lb upright sections of welding jigs for fabricating Allis-Chalmers metal-clad switchgear. The wrench consists of a special socket adaptor and standard reversible air motor. It was suggested by welder Paul Gerard of Allis-Chalmers Mfg. Co.

By means of two heavy adjusting screws, uprights are moved to





# Parallel Operation

with a BACKGROUND of OVER 30 YEARS



As shown in the illustration, either of two fans may be used and will generally carry approximately 70% of the normal load. The second fan can be arranged to start automatically when maximum capacity of the first fan has been reached.

Thus, a basic lower operation cost is realized and this safety factor assures continuous performance in the event of bearing or drive failure. In such an emergency, the boiler can be operated at 70% of normal load instead of a complete shut down, an important factor in large installations. Two boilers, operating from a Single, Twin Fan Stack can be arranged to operate either boiler from either fan.

Our project engineers have a background in fan-stack applications. Consult them for the answer to your draft problems.

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82-5 WATER STREET

EAST PORT CHESTER, CONN.

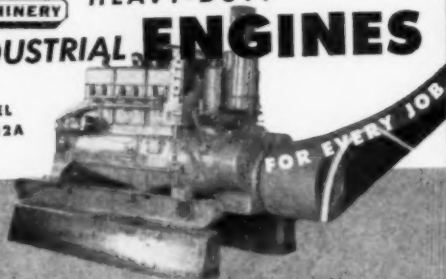
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## HEAVY-DUTY INDUSTRIAL ENGINES

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1210-12A



	<p><b>MODEL 283-4A</b> Cylinders... 4 Bore and Stroke: 4 1/4"x5" Max. H.P. at 1400 RPM: LP Gas... 56 70 Oct. Gas... 50 Natural Gas... 41</p>	<p><b>MODEL 1210-12A</b> Cylinders... 12 Bore and Stroke: 4 1/2"x6" Max. Corrected H.P. at 1300 RPM: Natural Gas... 215 LP Gas... 230</p>	
	<p><b>MODEL 206A-4R</b> Cylinders... 4 Bore and Stroke: 3 1/2"x5" Max. H.P. at 1500 RPM: Natural Gas... 33 70 Oct. Gas... 38 Distillate... 33</p>	<p><b>MODEL 403-4A</b> Cylinders... 4 Bore and Stroke: 4 1/2"x6" Max. H.P. at 1200 RPM: LP Gas... 70 70 Oct. Gas... 64 Natural Gas... 62 Distillate... 50</p>	
	<p><b>MODEL 425-6A</b> Cylinders... 6 Bore and Stroke: 4 1/4"x5" Max. H.P. at 1400 RPM: LP Gas... 81 70 Oct. Gas... 76 Natural Gas... 74 Distillate... 57</p>	<p><b>MODEL 1114A</b> Cylinders... 6 Bore and Stroke: 4 1/2"x6" Max. H.P. at 1200 RPM: LP Gas... 97 70 Oct. Gas... 93 Natural Gas... 88 Distillate... 80</p>	

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With MM heavy-duty power units, you get these exclusive features: high-turbulence combustion chambers... regulated cooling... removable cylinder heads and blocks... vacuum ventilating plus many other outstanding features.

For complete facts ask for MM's High Turbulence Power folder

# MINNEAPOLIS-MOLINE

MINNEAPOLIS 1, MINNESOTA



the proper width to clamp the switchgear frames securely for welding. However, different sizes of frames make it necessary that uprights sometimes be moved through distances up to 38". With the long ratchet wrench formerly used, this was slow, tiring work, with the danger of the wrench slipping off to cause possible injury. With the new arrangement, however, uprights can be quickly moved in or out to the desired distance, permitting a complete adjustment of the jig width in a matter of a few minutes.

### Selecting and Installing Gaskets

**T**EMPERATURE has much to do with gasket selection. If the gasket will not be heated above 240 F, it can be a non-metallic gasket. If it will be heated to a range between 240 and 800 F, an asbestos or asbestos covered gasket may serve the purpose. If the temperature will run above 800 F a metal gasket usually gives the best service.

The kind of flange to be gasketed is important; as it is the flange that usually determines the type of gasket to use. Next comes the factor of pressure. Then, is it a liquid, gas, or steam? Is it corrosive? Upon these things depend the kind of gasket material to use. You must not use rubber, for example, if the fluid is gasoline. You must not use copper if the gas is ammonia.

What is the nature of the flange surface? It should be smooth, preferably, to facilitate perfect sealing. Perfect contact between the gasket and flange surfaces is essential to assure tightness and prevent leakage. Rough flange surfaces, such as we all too commonly see, are a liability. The notion that roughness is necessary to prevent gasket from slipping is wrong.

"How can I install a thin and flimsy gasket between flanges already in place in a pipe line?" is a common question. The accompanying sketch shows how it has been successfully accomplished on large pipes with thin and flimsy rubber gaskets that were giving much



- ✓ Assured Safety
- ✓ Efficient Operation
- ✓ Minimum Fuel Costs
- ✓ Low Maintenance
- ✓ Long, Trouble-Free Life



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The high degree of skill acquired by Navco Engineers from long experience in solving unusual Piping problems is your guarantee of an accurate and workman-like Piping System.

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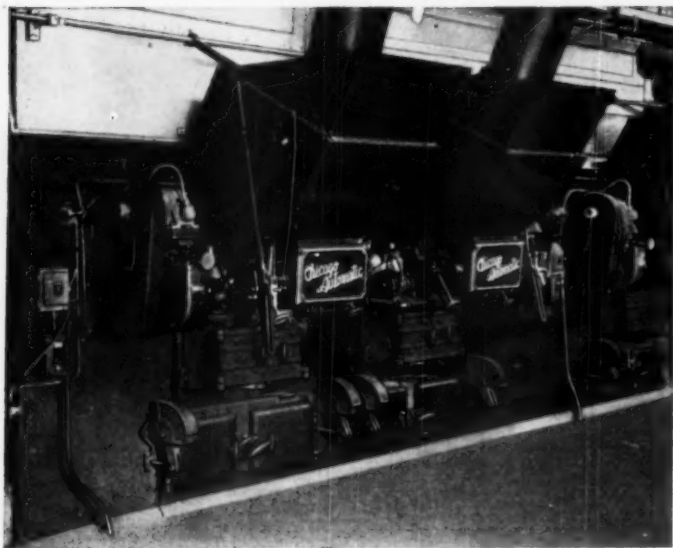


# NAVCO PIPING

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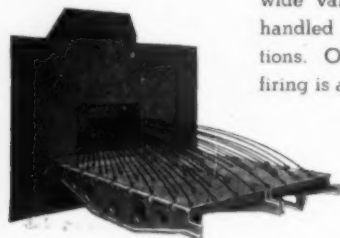




## How the Chicago Automatic Stoker Provides Uniform Lateral ~ ~ And Longitudinal Firing

**C**OAL distribution with this dependable spreader stoker is controlled by an adjustable firing plate in conjunction with a series of rotating distributing blades carefully selected for a definite grate area and specific draft conditions. After these blades are performance-set for proper angularity and spacing, coal is spread by the "underthrow" principle to reach all sections of the grates according to a fixed pattern. Spreader stoker firing—with the

Chicago Automatic is economical firing—a wide variety of the cheaper coals can be handled efficiently regardless of load conditions. Our long experience on spreader stoker firing is at your service.



*Write for recommendations*

THE STANDARD STOKER CO., INC.  
DEPT. D-1, 370 LEXINGTON AVENUE  
NEW YORK 17, NEW YORK

**THE STANDARD STOKER CO. • INC. •**

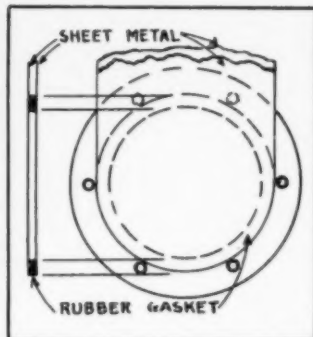
**Standard Stoker**



**NEW YORK • CHICAGO • ERIE • MONTREAL**

trouble because of folding or buckling.

You have a pipe joint that has been unbolted and the old gasket has been removed. The problem is to install a new gasket in place of the old one and be certain that it has not folded or buckled and that it is in its proper place when tightened.



Do it in this way: cut out two pieces of sheet metal as indicated in the sketch, one end being rounded to the exact curvature of the gasket. Place the gasket between the two pieces of sheet metal as shown in the sectional view, and then insert the assembly carefully between the flanges to the position shown in the sketch. Then carefully withdraw one of the pieces of sheet metal, and then the other, leaving the gasket behind in correct position for bolting.

Before inserting the gasket between the pieces of sheet metal make certain that no surface is "sticky" at any point, so that the position of the gasket will not be disturbed when the pieces of sheet metal are withdrawn.

S. W. FORT (ARK.)

### Lengthening Short Tubes

**W**HEN rolling tubes into a boiler, tank, header, or other pressure vessel, it is not unusual to come across one or two tubes that are shorter than the others. They may have actually been cut slightly shorter, or they may have a little extra bend so that when

[illegible]

IN THIS CAMPAIGN TO BUILD *EVERYONE'S* INDEPENDENCE

For this is the Treasury Department's *Independence Drive* to increase purchases of United States Savings Bonds. And the Payroll Savings Plan, now operated by 21,000 companies, is responsible for the greatest share of Series E Bond sales.

If your company does have the Plan, now's the time to put extra push behind it! Employees who pile up money in Savings Bonds feel more secure... are actually better workers. Moreover, Bond sales build a backlog of future purchasing power—good "business insurance" for all of us in the years ahead.

powerfully promoted throughout the nation by radio, television, publication advertising, posters, car cards, and special ceremonies. The public will be extra Bond-conscious during this period. Make sure your company adequately informs your employees that the convenience of "automatic" Bond buying is available through your Payroll Savings Plan.

This is your country—and it's *your* Drive. Help to put it over! All the material and assistance you need are available from your State Director, Savings Bonds Division, U.S. Treasury Department. Remember—employees *appreciate* Payroll Savings.

## SOUTHERN POWER & INDUSTRY



*This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.*

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...for better sealing... longer life. Don't gamble when making a packing replacement, make sure you select and GET Quality Flax Packings and the right type to fill your requirements.

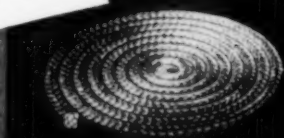
To play safe, just say, "Give me Belmont," when you next order flax packings and you'll be reducing maintenance costs. Quality and special constructions are Belmont features. Specialists select raw materials — engineers make the design and expert craftsmen produce all the world-famous Belmont styles right in the Belmont plant.

For better sealing... longer life Belmont Packings—ask for them in the blue box with the orange colored trade mark. Distributors located in every large industrial center are ready to serve you. Or, if engineering help on your job is required, write direct.

Catalog #40 is available.

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FOR EVERY SERVICE

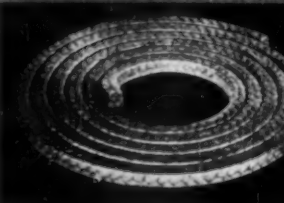
**THE BELMONT PACKING  
AND RUBBER CO.**  
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Philadelphia 37, Pa.



**BELMONT 401X (Coil or Rod)**  
— Best quality Line Flax Fibre  
of selected length and strength.



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Flax of selected quality, with  
coarse and short fibres ex-  
tracted. Treated with water-  
proof lubricant, and surface  
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they are to be inserted in the hole in the drum, it is found that they will not reach.

On bent tubes this is usually overcome by straightening them slightly so as to make them long enough to reach, but when straight tubes are being rolled in, this cannot be done.

An easy and safe way of elongating the tube is to place oil soaked rags inside the tube and light them. A good draft will be formed, and the tube will soon become hot enough to expand its length and permit it to reach through the drum and be rolled in just at the time when the tube end extends the required distance through the shell.

To avoid setting up undue stresses when the tube is cooled, a torch should be used to heat a considerable length of the tube to a cherry red before it has had a chance to cool from the burning rags. This heated portion of the tube is gradually reduced until only a few inches are being heated with the torch, and all stresses will then have been relieved.

This method of fitting short tubes is frequently used when erecting boilers, but it is equally serviceable on any tube rolling jobs on which the tubes are large enough to allow the rags to burn with a good draft.

## Hard Face Rod Eliminates Gauge Replacements

THREE years ago Southern States Iron Roofing Company of Savannah, Georgia, was having trouble with the flanging operation in the manufacture of 18 gauge steel turpentine drums. The sharp edges of the heavy steel were cutting into the gauges, causing replacement of the gauges about every six months.

To eliminate this maintenance problem, the company's machine shop cut grooves along the wearing point. The grooves were filled with a hard face welding rod which was then ground down to match the face of the gauge.

Gauges treated in this manner three years ago are still in regular use and haven't required a bit of maintenance.

### Maintenance of Boiler Blowoff and Drain Lines

**I**N many instances batteries of boilers discharge their blowoff lines, soot blower drains, water column drains, etc. into a common header to a blowoff tank or other disposal location.

This arrangement introduces a hazard to men working on the lines against which it is very difficult to guard. It is often necessary to have the blowdown or drain valves on a dead boiler open while men are inside. The operator is then confronted with this problem: Shall he guarantee the man inside that he will under no circumstances blow down a steaming boiler, or shall he tell the man that he will try to give him notice before blowing down, but cannot guarantee it?

In one case he risks throwing water into a turbine or engine, and in the other case, burning a man. This question often arises during early operation when construction men are working in other boilers, and presents to the operator a hard choice. The law does not permit valves, even check valves, in these lines.

For this reason, it is very desirable to isolate blowdowns and drains so that there is no connection from one boiler to another. Usually this can be accomplished by providing separate blowdown lines to the cooling water discharge tunnel or to a blowdown tank for each boiler.

In most cases, if maintenance men are properly alerted they can be warned by the rush of air or cold water from the opening in the blowdown line before steam and hot water reach the point. However, there is another partial solution, fairly simple, which will give him warning. A portable buzzer or horn with a push button on the operating floor can be used by the boiler operator before opening any blowdown valves when he is aware that there are men working on the lines. This is of course hardly adequate protection for men working inside of drums.

The interconnection of water column and soot blower drains with the blowdown system introduces the same hazard to a smaller

# DARTS

## COST LESS IN THE LONG RUN



**This True Ball Joint Makes the Difference**

Why? Because Darts are designed to be used over and over again. First of all, they have two bronze seats spherically ground to form a true ball joint. Thus, they tighten easily — form a drop-tight connection without excessive wrenching. No need to stretch or jam the seats. And once in place, the practically indestructible, air-refined, malleable iron of body and nut shrugs off tough abuse. Uncouple them whenever you want — use them over and over again.

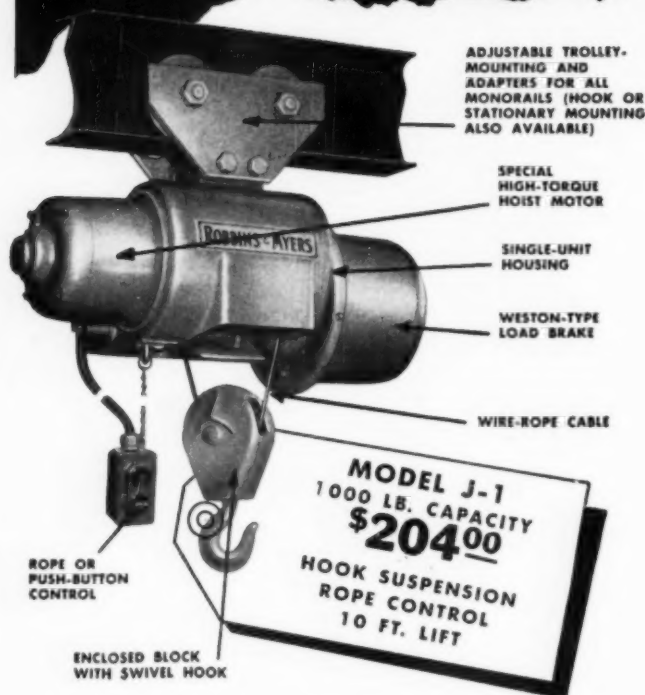
**E. M. DART MFG. CO.**  
Providence 3, Rhode Island



# NEW! LOW-PRICED!

## ROBBINS & MYERS

### Wire Rope ELECTRIC HOIST



You asked for a low-priced Robbins & Myers electric hoist . . . here it is! Quality-engineered and manufactured by the experienced men who make much heavier R & M hoists, this new "J" hoist will end a lot more costly, back-breaking lifting, give skilled labor more time to use their skills.

Lug, hook or trolley mounting . . . adaptable to 7 different beam sizes . . . the reliable "J" hoist is versatile, easy to operate. Little headroom is required. High-torque motor tailored to your exact needs. Push-button control for accurate spotting. Single-unit housing assures positive alignment. This hoist is ruggedly built; requires little maintenance. Sizes  $\frac{1}{4}$ ,  $\frac{1}{2}$  and 1 ton.

(WRITE FOR BULLETIN SP 451)

## ROBBINS & MYERS • INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

degree. The ideal system is completely to separate all blowdown and drain lines on each boiler so that there can be no possibility of steam being introduced into a dead boiler's lines or drums. Following the same line of reasoning it is very desirable to make the source of soot blower steam the individual boiler on which the soot blowers are installed rather than a common header from which soot blower steam is taken for use on several boilers.

JOSEPH H. DRAKE  
Reynolds, Smith & Hills  
Jacksonville, Fla.

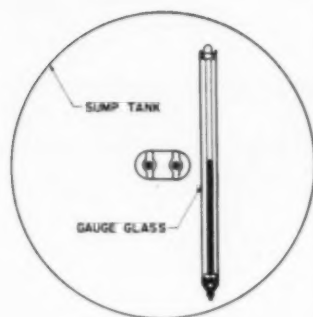
## Pumping Mystery Solved

IN a certain large building, the automatic water supply pumps that pump water to the storage tanks on an upper floor are supplied by a sump tank. This tank receives return cooling water from refrigerating and air conditioning equipment. During daytime hours, when the building water requirements are highest, the cooling water returns are insufficient to meet the demand during the winter months, and makeup water direct from the city mains is admitted to the sump tank through a hand controlled valve. This valve is adjusted so that just enough water enters the sump tank to maintain an approximately stationary level in the sump tank gauge glass while the pump is running. Normally only one pump operates at a time, the second pump being for standby service.

After years of satisfactory operation, difficulty began to be experienced in adjusting the makeup water supply. Finally it became impossible to maintain a stationary level in the gauge glass. The level would steadily rise until it was necessary to shut the supply valve entirely. Then the level would begin to descend, and would continue to drop even when the pump was stopped, despite the fact that a considerable flow of return cooling water was flowing into the tank.

The pump was suspected at one time and the second pump was started, yet the water level in the





gauge glass fell no faster with both pumps operating than when only one was running. The mystery was quite baffling to the four members of the engineering crew seeking an answer to the problem, until finally someone suggested checking the gauge glass connections.

It was then found that the bottom connection was plugged practically solid, even though it was located a foot above the bottom surface of the cylindrical tank.

Since there was only a small opening through the obstruction, the restriction caused the water level in the gauge glass to rise and fall at a slower rate than that in the sump tank. This explained the mystery. When the water supply valve was open enough to supply water to the tank faster than the pump withdrew it, the tank level rose rapidly but the level in the glass rose sluggishly. When the supply valve was gradually closed until closed completely, the pump would then cause the tank level to drop rather rapidly but the level in the glass dropped more slowly. So when the pump was stopped, the tank level was lower than the glass level and therefore the glass level would continue to drop for a while. When both pumps were run at the same time, the restriction prevented the level in the glass from dropping as rapidly as that in the tank; consequently it seemed that two pumps pumped no faster than one.

The connection was cleaned thoroughly and the glass replaced, and the trouble cleared up instantly. The water level responded to the valve adjustments and pump operation perfectly, and no further trouble was experienced.

THOMAS TRAIL (MD.)

# CAREFREE!

## BOILERS!

Manzel Chemical Feeders reduce scale, save heat, save steam, save fuel.



## TUBES!

Manzel Feeders cut down burns, prevent costly leaks.



## TURBINES!

Manzels minimize blade erosion, save expensive replacements.

## CONTROLS!

Manzel Feeders help keep valves, traps, etc. scale-free.



## FEED PUMPS!

Manzel Chemical Feeders reduce corrosion of liners.



## HOT WATER LINES!

Manzels cut down corrosion, increase pipe life.



Smart Power Engineers Use Manzel Chemical Feeders to Keep Water Correctly Treated...Automatically

● Whatever chemicals are recommended by corrosion experts, there is a Manzel Feeder to inject them automatically into your water lines in the exact proportion needed.

Manzel Chemical Feeders are available for operation from reciprocating drive, from rotary drive, from electric motor drive, and from gas or air pressure. They have been famous for many years for dependability, accuracy and economy. You, too, can reduce replacement and fuel costs, prevent breakdowns, insure profitable operation. Call your nearest Manzel representative or write...

Manzel Inc. now supplies repair parts for all models of Bowser and Torrington Lubricators.

Builders of HIGH PRESSURE METERING PUMPS Since 1898



318 Subcock St.  
Buffalo 10, N. Y.

## Valve Cage Support

**R**EMOVING the feather valve cage on the scavenger cylinder of a 1,000-horsepower gas engine required the use of several men and miscellaneous bits of timber until a support or jack was devised which accurately positioned the cage and held it while the nuts and bolts holding it to the cylinder were replaced or withdrawn.

The support was built up from heavy 2½-inch angle iron, welded to form two matching rectangles the same size as the valve cage. Through-plates in the centers of the long sides of the two rectangles accommodated a standard pantagraph or "grasshopper" type automobile jack, the socket for the extensible handle being set toward one end.

Mounted on sturdy casters, the support can be rolled into place by one man, and then the upper portion is lifted to press firmly against the valve cage while the unit is loosened. Four guide pins, working in matching holes at the corners of the unit, insure alignment of top and base and prevent unbalanced loading of the jack lift.

The cage is usually left on the support while the feather valves are serviced. Then it is wheeled back to the proper spot below the

cylinder, and raised into place as easily as jacking up a wheel on an automobile. With the support, the cage can be removed and serviced by one man, without calling in any of the other plant crew for temporary assistance.

ELTON STERRETT, Texas

## Increased Life for Soldering Tips

**W**ESTINGHOUSE has recently found a way of increasing the life of the copper tips of self-heating soldering irons. Normally, a copper tip, when used in continuous service, has a life of only a few weeks due to oxidation and alloying with the solder. But by plating the tip with a heavy coating of iron followed by a light plating with silver, the tip can be used for years rather than weeks.

The iron coating serves as a barrier between the copper of the tip and the solder. The silver coating facilitates the initial tinning of the iron and prevents the base of the tip, surrounded by the heating element, from oxidizing and freezing in the socket.

The iron plated tips do not drip solder and are excellent for close work. The plating also eliminates the need for cleaning, filing and dressing at two hour intervals.

## Silicone Lubricant Cuts Valve Maintenance

**F**OR about 21 hours a day, a bank of four Stellite processed Nordco plug valves in a finishing plant handles hydrocarbon gases at 200 to 500 C. During the other 3 hours, temperatures range from 500 to 700 C.

The most heat-stable organic lubricants could not prevent seizure of these valves even though they were reground every 3 months, carefully cleaned every 4 to 6 weeks and relubricated 3 to 4 times a day. At the best, life of the valves was limited to one year. Maintenance was an expensive and constant problem in this processing unit until the lubrication department recommended silicone valve lubricant.

Three years of experience have proved that valves relubricated once a shift with Dow Corning Silicone valve lubricant do not need to be reground. Valve life has been tripled; the cleaning schedule has been decreased from once every 4 to 6 weeks to once every 6 to 8 months; and present indications are that less expensive steel valves and plugs can be used.

This product has proved its advantages in many applications including valves handling such chemicals as acetic acid, acetone, methyl alcohol, iso-propyl alcohol, formaldehyde; in light duty ball bearings on multi-vane dampers exposed to the weather on one side and hot gases on the other; and in the packing of pumps handling such corrosive materials as sulphuric acid solution containing ammonium sulphate crystals.

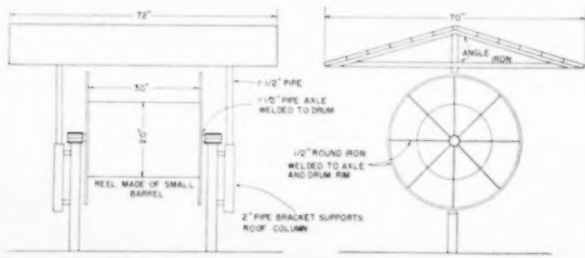
## Magnetic Trouble Recorder

**I**N many power applications it is desired to know what has happened on several different circuits just before one of them fails. One of the first of such devices consisted of a small rotating armature with a condenser connected to each segment of the commutator. The voltage at a particular time was impressed on the condenser and

## Fire Hose Reel

**T**HE fire hose reel shown here was made of scrap material and we have found it to be very satisfactory. The entire assembly is welded and the cover is made so the entire top can be removed by two men.

L. B. MCGEE (LA.)



# Jones

## ROLLER BEARING PILLOW BLOCKS

JONES Pillow Blocks are made in sizes to take shafts 15/16" to 9" in diameter. Equipped with double row Timken roller bearings. Engineered and designed for the most efficient solution of your drive problems. Ask for Bulletin No. 36.

W. A. Jones Foundry & Machine Co.  
4419 W. Roosevelt Rd., Chicago 24, Ill.

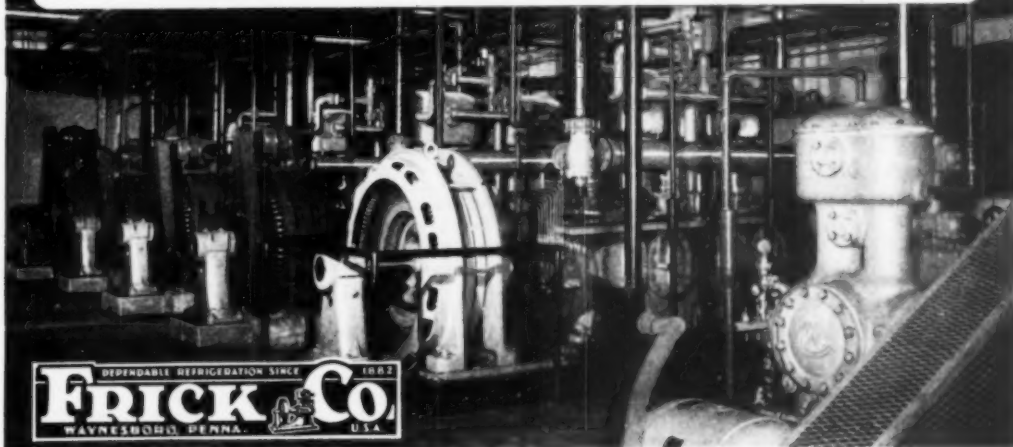
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**Jones**  
In the Service of Industry

Herringbone — Worm — Spur — Gear Speed Reducers  
Pulleys • Gears • V-Belt Sheaves • Anti-Friction  
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## Frick Refrigeration

Performs four distinct services at the Lake Wales plant of the Florida Citrus Canners Cooperative —replaces steam for heating the orange juice, condenses the moisture evaporated, quick-freezes the concentrate, and stores the frozen product at ten below zero. Fifteen Frick ammonia compressors, with motors totaling 3180 horsepower, carry these all-important loads. Similar Frick equipment is installed at the new concentrating plant at Florence Villa, Florida, among others. Get quotations now on Frick Refrigeration to meet YOUR special needs.



DEPENDABLE REFRIGERATION SINCE 1862  
**Frick Co.**  
WAYNESBORO, PENNA. U.S.A.

subsequently erased if it was not needed. If the proper relay was closed by the failure, the voltage from the commutator would be impressed upon an oscillograph giving a record of what had happened just before the operation of the relay.

A more modern system uses a cathode ray oscilloscope tube with a special fluorescent screen having more than the usual persistence. When a relay is actuated by an outage, a camera takes a picture of

the scope giving an idea of what had gone before.

The method about to be suggested is not as complicated as either of the methods mentioned above, and is capable of giving a much longer record both before and after the failure. The magnetic tape recorder is almost ideally suited to record data of this type. A loop of wire can be run continuously through the recording head and its unwanted record can be obliterated immediately before coming in

contact with the recording head again. When a failure occurs, a relay may be used to turn the recorder off immediately or several seconds later. There may be a bank of several recorders used or one recorder with several obliterating and recording heads may be used. The cost of monitoring each additional circuit is only the cost of the two heads.

Following the failure, the tape may be played back to an oscillograph or may be transcribed to a visible record by some other suitable electrical or mechanical device.

A. J. HUMPHREY (TENN.)

# PEROLIN



Perolin Products are manufactured and guaranteed by a company with nearly a half century of experience in operating efficiency.

PEROLIN BOILER TREATMENT ..... for Scale and Corrosion Control  
 PERO-NITE ..... Soot and Fire Scale Remover  
 PEROLIN FUEL OIL TREATMENT ..... for Soot and Sludge  
 FORMET WATER TREATMENT ..... for Air Conditioning

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*The PEROLIN COMPANY, Inc.*

Manufacturing Chemists since 1904

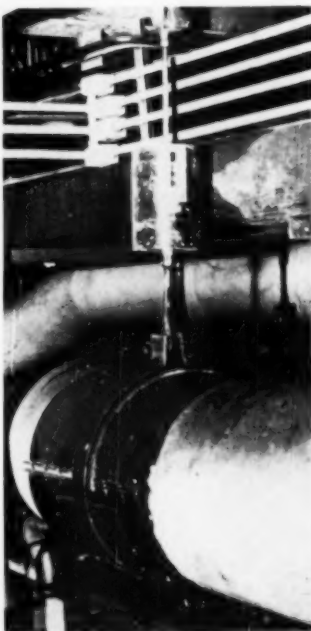
NEW YORK 16 • CHICAGO 9

NOTICE TO SALES AGENTS: SOME TERRITORIES STILL OPEN — WRITE US

## Insulation of Pipe Supports

TO prevent excessive heat losses due to direct metal-to-metal contact between hot pipe surfaces and structural supports, insulated supports, so-called, may be used. In this type of installation, developed by Sargent & Lundy, Engineers, from test work done at the University of Illinois, the entire length of piping is insulated in the usual manner and then supported by hangers or by channel irons.

Where the piping is to be supported by a hanger, a No. 10 gauge



steel plate, its length proportioned to the load to be carried, is rolled into a band to fit the insulated pipe and provided with a flange for assembly. A saddle plate,  $\frac{3}{8}$  in. thick, is then tack welded around the lower half of the flanged band, to assist in carrying the direct load and in spreading it over a wide area. The unit is then bolted in place around the insulated pipe, a miller bar is fitted over the upper half of the flanged band, and the usual hanger strap is fastened around the entire assembly.

Where the pipe line is to be supported by channel irons, a 16-gauge sheet metal band, 18 in. long and flanged for assembly, is bolted around the insulated pipe at each point of support.

Since the pipe rests on the insulation at the supports, the insulating material used must be able to bear the weight of the pipe. On the basis of the tests conducted at the University of Illinois, a loading capacity of 10 lb per sq in., or 100 lb per running in. of line, has been established for 85% Magnesite.

*Courtesy,  
Magnesia Insulation Mfg. Assoc.*

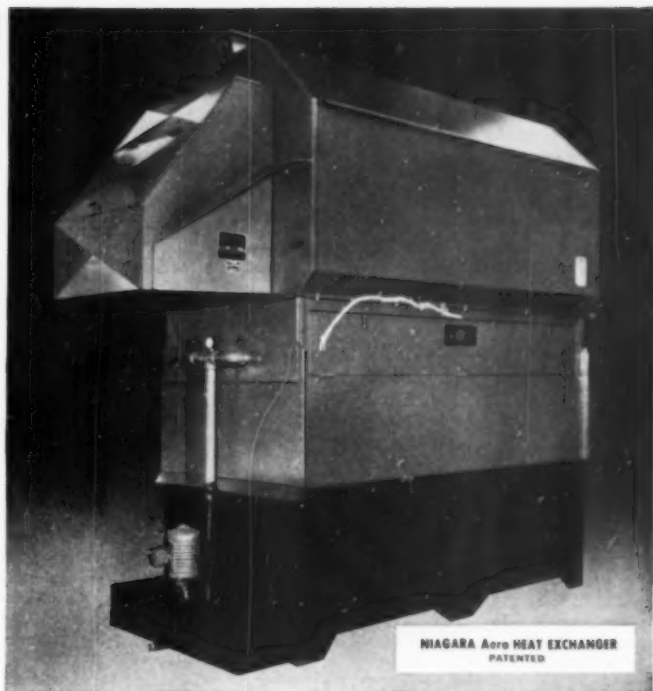
## Purchasing for Maintenance

(Continued from page 71)

chased for his safety or the enormous cost to the company in maintaining an adequate safety program. Of course, it is to the company's advantage to keep the efficiency of its safety program at a high peak, in order to produce their products at capacity levels, but our management is even more concerned in the welfare of its employees than in productivity.

Engineering, Operating and Purchasing, like any team, must have teamwork to win. And if the members of these departments all work together, there is no limit to what can be accomplished.

Teamwork in eliminating waste of materials, abuse of equipment, and unnecessary use of utilities will ultimately result in cost reduction by allowing your company to reduce the amount of purchased supplies.



## SAVE COOLING WATER

### Get Many Other Benefits and Cost Savings

• Niagara Aero Heat Exchangers provide faster and more accurate cooling to specified temperatures for liquids in many industrial processes. They help lower production costs.

Cooling by the evaporative principle, they transfer heat to air, which is easily disposed of, and consume less than 5% of water used in conventional cooling methods. A Niagara Aero Heat Exchanger replaces both shell-and-tube cooler and cooling tower, and saves piping and pumping. Its savings quickly return its cost.

It helps improve the quality of production by removing heat at the rate of in-put, and by greater accuracy of control. For example, as applied to heat-treat quenching or to a chemical process cooling, provision for heating as well as cooling saves the time and prevents the product losses of a "warm-up" period.

Successful applications also include control of temperatures for jacket coolants for engines, hydraulic equipment, transformers and electronic sets, and special industrial equipment.

Write for Bulletin No. 96

### NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

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Atlanta Office: Crawley-Gorbandt Co., 118 W. Peachtree Pl. N. W.

INDUSTRIAL COOLING  HEATING • DRYING

**NIAGARA**

HUMIDIFYING • AIR ENGINEERING EQUIPMENT



# NEWS

## FOR SOUTHERN INDUSTRY

### Dow Opens Atlanta Office

THE DOW CHEMICAL COMPANY has opened a new sales office in the 161 Spring Street Building, Atlanta, Georgia, according to an announcement by DONALD WILLIAMS, director of sales. The new office greatly facilitates the movement of the company's products to users in a five-state area including GEORGIA, NORTH CAROLINA, SOUTH CAROLINA, ALABAMA, and FLORIDA.

LEROY C. STEWART, manager of the Washington, D. C., office since its establishment in 1941, will have charge of the new Atlanta office. Mr. Stewart has been with the Dow organization since 1918. He has taken an important part in many phases of the company's production, research, and sales development activities. He is a member of the American Chemical Society and the American Institute of Chemical Engineers.

### Engineers Hear Corrosion Expert

MR. M. C. MILLER, chief corrosion engineer, EBASCO SERVICES, New York, spoke at a recent regional meeting of Mechanical Engineers held in the Sheraton Hotel, High Point, N. C. Mr. Miller explained how the application of cathodic protection has saved thousands of dollars for municipalities, utilities, and industrial plants. By the investment of relatively small amounts, corrosion and rusting of underground equipment can be held to a negligible minimum.

Following Mr. Miller's talk, Mr. EDWARD E. WILLIAMS, superintendent of steam stations of the DUKE POWER COMPANY, was awarded a Fellow Membership in the American Society of Mechanical Engineers. This is an honorary membership group, open to the country's outstanding engineers. Mr. Williams is the first engineer in this region to be so

### Cummins Diesel Opens Memphis Plant

An activated cutaway engine was featured at the opening of the new \$100,000 plant of the CUMMINS DIESEL SALES CORPORATION at Memphis, Tennessee.

Left to right, R. E. HUTHSTEINER, executive vice president of the Cummins Engine Company, Inc.; J. G. HULL, Memphis manager; W. B. LAWRENCE, general manager of domestic Cummins subsidiaries, and W. G. TURNER, regional manager for Cummins at Atlanta.

Designed to provide the most efficient service to operators of Cummins Diesel-powered equipment, the new plant has 12,000 sq ft of floor space and is fully equipped for complete engine overhaul and rebuilding. Branches of the Memphis dealership are located at Little Rock, Arkansas and Knoxville, Tennessee.



### FUTURE EVENTS Of Engineering Interest

**AMERICAN TEXTILE MACHINERY EXHIBITION**, National Ass'n of Textile Machinery Mfgs., Theodore Dawhurst, Sec'y, c/o Universal Winding Co., Providence, R. I.

May 8-12, Exhibition, Atlantic City Auditorium, Atlantic City, N. J.

**HOUSTON INDUSTRIAL EXHIBITION**, Ed G. Lenzner, Gen. Mgr., 41 San Jacinto St., Houston 2, Texas.

May 10-14, First Annual Exposition, Coliseum, Houston, Texas.

**AMERICAN SOCIETY OF MECHANICAL ENGINEERS**, Sec'y, 29 West 39th St., New York, N. Y.

June 12-16, Oil & Gas Power Division Conference, Lord Baltimore Hotel, Baltimore, Md.

June 19-23, Semi-Annual Meeting, Hotel Statler, St. Louis, Mo.

June 22-24, Applied Mechanics Division Conference, Purdue University, Lafayette, Ind.

Sept. 25-27, New Orleans Section 1950 Conference, New Orleans, La.

**THE INSTRUMENT SOCIETY OF AMERICA**, Sec'y, 921 Ridge Ave., Pittsburgh 12, Pa.

Sept. 18-22, Fifth National Instrument Conference and Exhibit, Memorial Auditorium, Buffalo, N. Y.



AT LEFT, M. C. MILLER, EBASCO SERVICES, SPEAKS TO THE FIDMONT SECTION, A.S.M.E., ON THE SUBJECT OF CATHODIC PROTECTION. AT THE RIGHT, ED E. WILLIAMS, DUKE POWER CO., PAST VICE-PRESIDENT REGION IV, RECEIVES A CERTIFICATE OF FELLOW MEMBERSHIP FROM ARTHUR ROBERTS, LYNCHBURG FOUNDRY, VICE-PRESIDENT, REGION IV.

honored. The award was made to him by ARTHUR S. ROBERTS OF LYNCHBURG, VIRGINIA, who is a vice president of the national organization.

Mr. Williams has been with Duke Power Company for twenty-five years and has seen the installed capacity of the system grow from 650,000 kilowatts in 1924 to almost a million kilowatts today.

MEBANE E. TURNER, mechanical engineer, R. J. REYNOLDS TOBACCO CO., Winston-Salem, N. C., was also honored with a certificate in recognition of the services he has rendered the society. He served as chairman of the Piedmont Section, 1948-49.

Mr. Aubrey Dunbar of Tomlinson of High Point and Mr. Isaac Fiddler, Brown Boveri Corp., High Point, were in charge of arrangements for the meeting.

## Quaker Rubber Opens New Atlanta Branch

QUAKER RUBBER CORPORATION, Division of H. K. Porter Company, Inc., has established a new stock carrying branch at 746 Lee Street, S.W., ATLANTA, GEORGIA.



The new Atlanta Branch will be headed by Mr. D. C. VINSON of Atlanta, Georgia, a former field representative for Quaker Rubber in the South.

Quaker Rubber Corporation, manufacturers of individual rubber belting, hose, packing and moulded rubber products, are the most recently acquired division of the H. K. Porter Company, Inc., of Pittsburgh. Other divisions of H. K. Porter include Hinderliter Tool, Quimby Pump, American Fort Pitt Spring, J. P. Devine, Brake Equipment & Supply and Jarecki Mfg. Company.

## Southern Agricultural Machinery Manufacturers to Exhibit at Atlantic Steel's Open House

The Southern agricultural implement industry will unveil its newest developments at the Atlantic Steel Company's "DIXISTEEL ON DIXIE FARMS" Open House, May 5th and 6th in Atlanta, Ga.

The following Southeastern manufacturers, who use Atlantic Steel Company's prime materials or processed parts will offer a diversified array of machinery and equipment:

GEORGIA: Blanton Plow Company, Rome; Clark Manufacturing Company, Decatur; Gantt Manufacturing Co., Macon; King Plow Company, Atlanta; Knox Metal Products, Inc., Thomson; Lilliston Implement Company, Albany; Martin Manufacturing Company, Fitzgerald; Ford McClesky Manufacturing Company, Marietta; Mobley Machine Works, Hawkinsville; New Ideal Sprayer Company, Nashville; Rome Plow Company, Cedartown; Southern Iron & Equipment Company, Atlanta; Southern Plow Company, Columbus;

## NEW PLANT TURNS PINES INTO PAPER!

Southern pines are made into 100,000 tons of newsprint annually in this huge plant of the Coosa Newsprint Co., Childersburg, Ala., shown under construction. Ingalls fabricated and erected the dozens of processing and storage tanks.

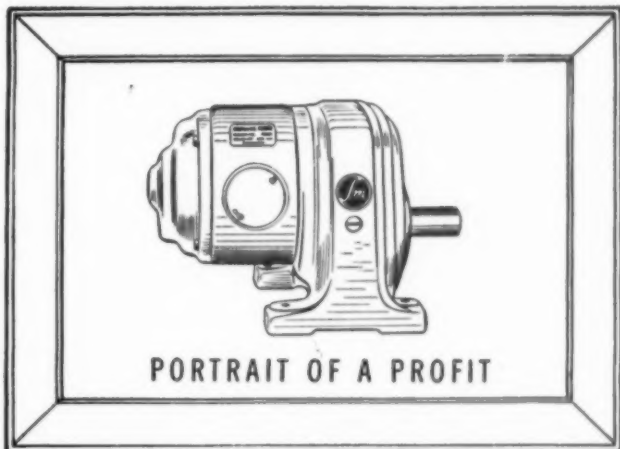
When you need fabricated steel work of any type, plate work, as well as structural, contact INGALLS, one of the nation's leading independent fabricators. Five plants, complete engineering staff. Write for information.



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STAINLESS STEEL • STORAGE TANKS  
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THE INGALLS IRON WORKS COMPANY

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PORTRAIT OF A PROFIT

For greater profits, use Sterling Slo-Speed Electric Power Drives

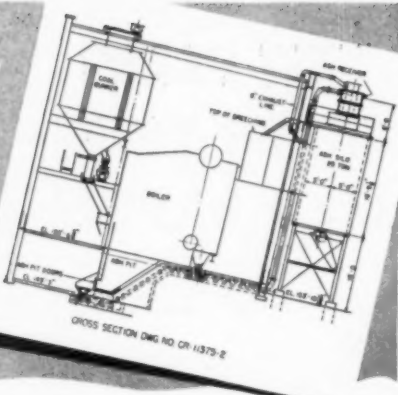
**STERLING**  
ELECTRIC MOTORS

PLANTS: NEW YORK 51, LOS ANGELES 22, HAMILTON, CANADA—OFFICES IN PRINCIPAL CITIES

Write for Bulletin

SLO-SPEED (Geared) • SPEED-TROL (Variable Speed) • KLOSD (Normal Speed)

*Another*  
**COAL and  
ASH HANDLING  
INSTALLATION  
by  
BEAUMONT**



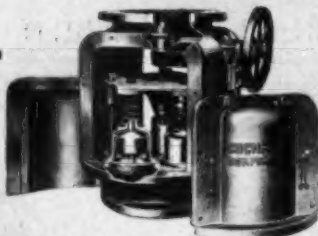
Here's one of the many efficient coal and ash handling installations—designed, manufactured, installed by Beaumont. The above system is operating at the Philadelphia plant of Yale & Towne Manufacturing Company. This plant saved both time and expense—through one-contract-economy... But you're right! It's up to us to convince you of the advantages in a Beaumont installation. So let us send you our folder of typical installations. Write to:

**Beaumont BIRCH COMPANY**  
1519 RACE STREET, PHILADELPHIA 2, PA.

DESIGNERS—MANUFACTURERS—ERECTORS BULK MATERIAL HANDLING SYSTEMS

**WON'T STICK  
WON'T JAM  
WON'T FREEZE**

MANY SMALL  
DISCS INSTEAD  
OF ONE  
LARGE DISC  
REDUCES  
IMPACT,  
MAKES A  
TIGHTER  
VALVE.



MANY SMALL  
PORTS INSTEAD  
OF ONE  
LARGE PORT  
PREVENTS  
FAILURE,  
MULTIPLIES  
FLOW  
AREA.

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RELIEF VALVES**

COCHRANE CORPORATION • PHILADELPHIA 32, PA.

and R. A. Whitfield Manufacturing Company, Atlanta.

ALABAMA: Allis-Chalmers Manufacturing Company, Gadsden; J. I. Case Company, Anniston; and W. F. Covington Planter Company, Dothan.

TENNESSEE: Athens Plow Works, Athens; Knox Porcelain Corporation, Knoxville; Lamons Wagon Company, Greenville; Shelby Manufacturing Company, Arlington; and Taylor Implement Company, Athens.

MISSISSIPPI: Chewalla Sanitary Brooder Mfg. Company, Holly Springs; and Poplarville Implement Company, Poplarville.

NORTH CAROLINA: Meadows Mill Company, North Wilkesboro; Turner Manufacturing Company, Statesville; and Wayne Agricultural Works, Inc., Goldsboro.

FLORIDA: Hester Plow Company, Inc., Jacksonville.

The Southern Research Institute of Birmingham, Alabama will also have an exhibit.

In addition to the mechanized exhibits, plant engineers are invited to attend the extensive plant tours. Beginning with the open hearth and continuing on through the plant, displays will show how raw materials are processed into semi-finished and finished products. Tour will include open hearth, soaking pits, blooming mill, bar mill, strip mill, wire and nail mills, galvanizing department, and forge shop.

**SSIRCO Announces  
Personnel Changes**

EUGENE W. BEALL, JR., has been promoted from SAVANNAH sales representative to manager of SOUTHERN STATES IRON ROOFING COMPANY's branch in COLUMBIA, S. C.

In making the announcement from the firm's home office in Savannah, Georgia, LEE BARTHOLOMEW, vice president of sales, cited Beall's six-year background with the company.

Starting as assistant manager of the Birmingham, Alabama, branch, he later filled the same position at the Savannah branch. In December, 1945, he went to Columbia as sales representative and was transferred back to Savannah in February, 1948, as sales representative there.

Replacing Beall as Savannah sales representative is J. A. SMITH, who is returning to active selling after two years of training the company's greatly enlarged sales force. He has been with the company five years, and has a total of twenty years sales experience.

# NEW EQUIPMENT for Southern Industry

## Chipping Hammer

F-1

INGERSOLL-RAND COMPANY, Phillipsburg, N. J., has announced a line of chipping hammers known as the Controlled Power Chipping Hammer line. It offers a selection of 15 power sizes with 5 basic hammer sizes. Each basic hammer size is available in normal-cut, extra-cut, and supercut type.



The line was developed for industrial use in meeting the demands of present day steel castings, new alloys, high tensile strength cast iron, and other metals of exceptional strength and toughness. Special design features reduce operator fatigue.

## Fly Ash Collector

F-2

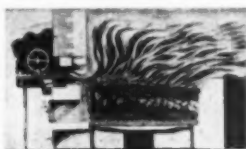
THE BUELL ENGINEERING COMPANY, 70 Pine St., New York 5, N. Y., has developed a low resistance fly ash collector to meet the requirements of the small modern boiler plant of 100-2000 developed boiler horsepower, whether fired by hand; under-feed, traveling grate; or spreader-stoker.

The unit is said to combine high efficiency and a low draft loss, adapting it to natural draft as well as economic operation under mechanical draft. Complete information is available in the "LR" Bulletin which will be furnished by the manufacturer.

## Stoker

F-3

THE FYR-FEEDER ENGINEERS, DIV. AMERICAN COAL BURNER Co., 18 East Erie St., Chicago, Ill., announce FYR-FEEDER automatic low cost burning systems.



Efficient combustion of low cost fuels, wood chips, sawdust or the lowest price sizes of coal can be burned with highly satisfactory results.

## Light Tractor

F-4

CLARK EQUIPMENT CO., INDUSTRIAL DIVISION, Battle Creek, Mich., has announced a new towing tractor, which need not be ridden to be operated, and which despite its small size will tow 10 tons on trailers over a level course at speeds from 1 to 6.5 mph. The driver can operate the machine while walk-



ing on either side of it. The advantage of this feature is that it facilitates order-selection work. The driver can

**Free additional information is available to readers of Southern Power & Industry. Check item code number on the postage free service coupon post card provided on p. 17.**

move the tractor and train a few feet at a time, or from item to item in the order-selection line. The weight of the train acts as a brake, thus giving the driver maximum time to pick and place items on the trailers. The parking brake is actuated by electricity. The tractor is useful in warehousing, textile, and transportation fields.

## Air-Meter

F-5

HASTINGS INSTRUMENT CO., Inc., Hampton, Va., announces an electrical anemometer which is claimed to be free of the effects of rate of change of temperature.



The Hastings Model G Air-Meter provides instantaneous, direct readings of air velocities from 5 to 6,000 fpm with an expanded scale in the low velocity ranges, and is now available with built-in temperature compensation to prevent momentary error in velocity reading when the probe is subjected to sudden changes of temperature. The instrument is applicable to the air conditioning industry, in process control, and in research installations in which it is desired to obtain readings quickly.



## STRIP PAINT from transformers —easily!

**Y**OU already know that stripping paint by scraping and sand-blasting can be time-consuming work. You've seen punctured cooling fins, damaged surfaces . . . seen stripping failures. But now you can simplify the job of stripping paint from transformers by using designed-for-the-job Oakite materials and techniques.

Oakite paint-stripping materials have what it takes to break the bond between paint and surfaces. They leave surfaces in A-1 shape for repainting or repair. And the three Oakite methods—hot flow-on, cold spray, steam gun—are simplicity itself. Economy? Case history records show that stripping paint the Oakite way can make great reductions in costs.

Arrange with your nearby Oakite Technical Service Representative to see Oakite paint-stripping materials in action. Or write for FREE data to Oakite Products, Inc., 23A Thames St., New York 6, N. Y.

**SPECIALIZED INDUSTRIAL CLEANING**  
**OAKITE**  
MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in  
Principal Cities of United States and Canada

## Portable Vacuum Cleaner

**F-6** U. S. HOFFMAN MACHINERY CORP., 105 Fourth Ave., New York 3, N. Y., has announced a new 3 hp heavy duty vacuum cleaning portable, providing 4.4 cu ft of dust storage capacity and designed for continuous operation on heavy dust deposits.

The new machine, known as the Hoffco-Vac No. 30, will operate one 50 ft length of 1½ inch vacuum hose. Nine dust bags provide a total bag surface area of 30 sq ft, thus providing separation of hazardous fine dusts. Vacuum producer, of the multistage centrifugal type, is made of aluminum castings and is equipped with self-lubricated ball bearings, outboard mounted. Motor operates the exhaust through a multiple V-belt drive and both are supported on rubber cushions. The unit is compactly designed for ease of maneuvering through plant aisles and congested areas.

## Sight Savers

**F-7** DOW CORNING CORPORATION, Midland, Mich., announces the availability of Sight Saver tissue dispensers for plant and office use. The container holds a normal month's supply of 3 x 7-in. Sight Saver tissues to keep eyeglasses and goggles clean.

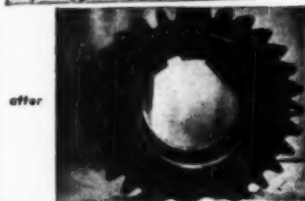
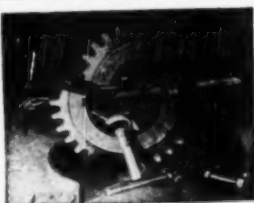
The tissues are impregnated with a special silicone that gives added clarity and luster to glass. This silicone also forms an invisible coating and protects the surface and prevents the adherence of most organic materials. No fluid is required. The only servicing involved is the simple insertion of a refill pack of tissues. The dispenser and refill packets are available from safety and office supply houses.



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CARDS



**METALOCK**

This 30" diameter gear broke in 3 places. The repair was made for a plastics plant in New Jersey through the Royal Indemnity Co. of New Jersey in October, 1946. The gear is still in operation.

**A COLD REPAIR FOR CRACKED AND BROKEN CASTINGS**

For Information and Service  
**METALOCK CASTING REPAIR SERVICE**

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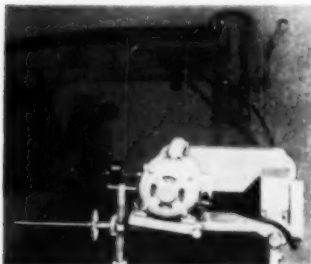


## FREE READER SERVICE

To obtain free information on this equipment, circle number on the page 17 free post card.

### Power Feed Attachment

**F-8** DEWALT INC., Lancaster, Pa., has introduced a Power Rip Feed attachment for a radial arm saw. The equipment can be attached to almost any radial arm saw and many under table saws. It may be attached quickly and securely with two mounting brackets supplied with the unit.



The attachment is designed for use in straight rip sawing, bevel ripping, molding, power feed shaping, ploughing, grooving, and rabbeting.

The unit is equipped with adjustable feed rollers for feeding material into the cutter and taking cut material away. Material is fed by these rollers and held firmly against the guide strip to assure the maximum accuracy in cutting operations.

The belt drive of the unit may be adjusted to feed material into the cutter at rates of speed ranging from extreme low to a high of 120 fpm, according to tests conducted for the needs of the average machine operator.

### Carbide Drills

**F-9** ROCK BIT SALES & SERVICE Co., 2514 East Cumberland St., Philadelphia 25, Pa., is producing tungsten-carbide insert



drills in two types. The first type is a four-point, star drill for drilling holes in all non-metallic construction materials. The other type is a chisel drill for drilling holes in non-metallic construction materials as well as being used as a chisel for inletting in all masonry materials or for scarfing.

The manufacturer states that these percussion-type drills will drill through light reinforcing rod when used with electric or pneumatic hammers.

### Variable Speed Drive

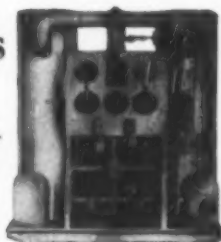
**F-10** RELIANCE ELECTRIC & ENGINEERING Co. has developed a  $\frac{3}{4}$ -2 hp V\*S Drive adaptable to a wide range of machinery as original equipment, or in application to machines already in use. Taking power from a-c lines, the drive is said to provide smooth starting, jogging for set-up, and adjustable speed over a wide, stepless range. Rapid dynamic braking and reversing are optional features. All functions



are at the operator's finger tips in the control station which may be placed at any convenient location. Positioning of the compact control unit is likewise flexible, as wiring is the only connection involved between the three elements: operator's station, control unit, and motor.



## Pritchard's New HYDRYER\*



- For Efficient Drying of Compressed Air and Other Gases
- Packaged Units for Instrument Air and Industrial Processes
- Only Service Connections Required

Pritchard HYDRYERS are unequalled for efficiency and dependability in drying air for instrument and process controls. Standard packaged units are designed to reduce dew points of compressed air and other gases to minus (-) 40° F. No special installation required. Specially designed units may be built to your requirements.

Write for FREE Bulletin No. 16.0.080

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**NATIONAL AROIL BURNER COMPANY INC.**

1297 East Sedgley Avenue, Philadelphia 34, Pa.  
Southwestern Division: 2812 S. Blvd., Houston 6, Texas

### Hand Hoists

**F-11** WRIGHT HOIST DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC., York, Pa., has announced a new line of Safeway hand hoists.

The new hoists are made in capacities from 1/2 ton to 4 tons. The manufacturer states that they are

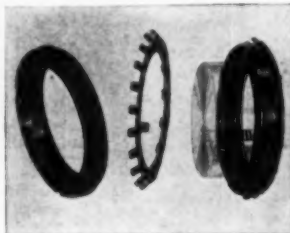


compact, close headroom, lightweight, and easy to handle in tight places.

Their construction is said to feature simplicity of design, a modern gear drive, Weston type brake, steel load chain, steel housing, self-lubrication, and drop forged top and bottom hooks.

### Locknuts and Lockwashers

**F-12** LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill., announces the manufacture of a line of bearing-positioning locknuts and lockwashers, specially designed for effectively locking the various makes of ball and roller bearings in correct position on shafts of 5/16 to 7 11/16 inches diameter.



Advantages claimed are—precision manufacture to A.B.E.C. and S.A.E. standards; attractive appearance; easy to install and remove; rust-resistant; vibration proof; smooth, burr-free.

Detailed dimensions are contained in a 4-page illustrated Folder No. 2348, which will be sent to any interested reader upon request.

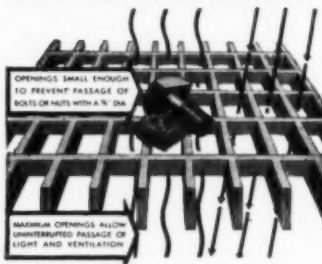
### Air Handling Units

**F-13** WESTINGHOUSE ELECTRIC CORPORATION, Sturtevant Division, Hyde Park, Boston 36, Mass., announces a new line of air handling units, designated Types AH and AV, intended primarily for remote installation in central plant type air conditioning systems. These units can also be used for commercial and industrial heating and ventilating. Sizes range from 1,650 to 14,060 cfm at 500 fpm coil face velocity when direct expansion coils are used and up to 18,000 cfm when water coils are used. Standard and double tube steam heating coils are also available. All coils utilize continuous plate fin construction.

Of standardized design and construction, each unit consists of a fan section—with two backwardly in-



## TRI-LOK RECTANGULAR OPEN STEEL FLOORING



Tri-Lok strength is obtained by truss action through twisted cross-bar, curved in opposite directions at each bearing-bar. Standard openings in Tri-Lok Rectangular Steel Flooring are 1" x 3 3/4"—other size openings can be supplied as required.

Diagonal, or Super-Safety U-type Flooring, and stair treads of all types, are available. Bulletin KE 1140 describes the construction features of Tri-Lok Open Steel Flooring.

### DRAGO CORPORATION

National Distributor for the Tri-Lok Company

Dravo Bldg., Pittsburgh 22, Pa.

Sales Representatives in Principal Cities



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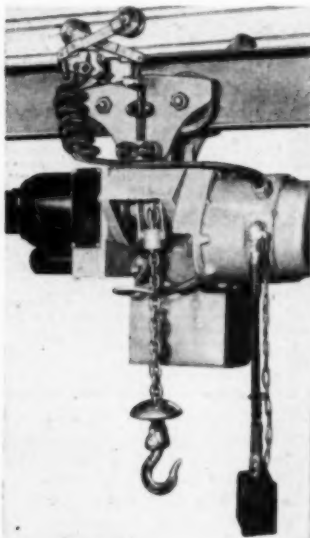
To obtain free information on this equipment, circle number on the page 17 free post card.

clined blade Silentvane type fan wheels mounted on a common shaft—and a coil section with drain pan for cooling and heating coils, depending upon the requirements. Filter sections, face and by-pass dampers, and other accessories are available.

## Electric Hoist

**F-14** THE YALE & TOWNE MFG. Co., Philadelphia Division, Philadelphia 15, Pa., has announced a new chain-type electric hoist. New performance features are lifting speeds up to 41 fpm, a lower as well as an upper limit stop, and a wide "pick-up" angle.

The hoist is available in load capacities of 500, 1000, and 1500 pounds. Standard models lift loads through any height up to 40 ft. The hoist's principal distinction is that link chain, over an electrically driven sheave, supports the load. This permits extra long lifting lengths since wound-up chain does not wrap around a drum but collects in a metal container as the hook raises. Thus, for high lifts requiring long chains, all that is needed is a larger chain container.



The hoist hook can reach out as far as 30 degrees from the vertical to pick up loads.

The manufacturer's bulletin P-1172 gives engineering specifications and technical data on all models.

## Terminal Blocks

**F-15** BUCHANAN ELECTRICAL PRODUCTS CORPORATION, 1290 Central Ave., Hillside, N. J., announces a new solderless type "Bepco" molded terminal block that eliminates the need for wrapping wires around studs or applying terminals to wire ends.

The blocks are provided with compression type solderless units, each capable of receiving wires from No. 16 to 6 AWG. Attachment of wires to block is accomplished by tightening screws after insertion of stripped wires. The blocks are rated at 35 amperes—600 volts, and are available in 4, 8, and 12 circuit sizes.

## Aluminum Electrode

**F-16** EUTECTIC WELDING ALLOYS CORPORATION, 40 Worth St., New York 13, N. Y., is producing a new welding electrode for aluminum and aluminum alloys known as Eutectrode 2101.

The product is characterized by high tensile strength, easy handling, and economy of operation. It is available in 1/8 inch and 3/16 inch sizes. For further information write the manufacturer for Bulletin EU-29.

## Control Valve

**F-17** THE ATLAS VALVE COMPANY, 282 South St., Newark, N. J., has introduced the Atlas No. 235 adjustable lift-opening lever operated control valve designed to provide an easy method of setting the valve lift at the required position at any point within the range of the valve movement. The oil flow may be varied to match the air flow, thus making the valve useful in maintaining a ratio, such as oil flow and air flow in an oil fired steam boiler.

The manufacturer recommends the valve for control of steam, oil, water, air, or gas, and particularly for controlling the flow to oil or gas burners, the speed of steam driven blowers or stokers, or the flow of steam to steam atomizing oil burners.

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## Flexible ALL METAL COUPLINGS

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REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

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for more than 30 years



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FLEXIBLE  
DISCS

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FRICTION  
WEAR and  
CROSS-PULL  
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PERFECT BALANCE UNDER ALL  
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THOMAS FLEXIBLE  
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Combination  
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## CATALOGS AND BULLETINS

(Continued from page 17)

**B-10 FURNACE INSTALLATIONS**—Catalog, 40 pages—Describes Abco furnace and boiler settings in Southern industrial plants. Installations designed to convert waste materials into low-cost steam. 7-page section on Acme designed arches and supporting walls.—ABCO FURNACE DIVISION, ACME BRICK COMPANY, Fort Worth 2, Texas.

**B-11 PNEUMATIC TOOLS**—Catalog, 47, 24 pages—Describes Cleco pneumatic tools for industry—heavy grinders, sanders, buffers, rotary file and burr machines, drills, reamers, screwdrivers, impact wrenches, etc.—CLECO DIVISION, REED ROLLER BIT COMPANY, Box 2119, Houston, Texas.

**B-12 RUST PREVENTION**—Brochure, 6 pages. Describes features of new Eriez rotary magnets for floors, tanks, driveways, and general use. Illustrates rotary sweepers and tank magnets. Gives list of industrial applications. Includes prices and specifications.—ERIEZ MANUFACTURING CO., Erie, Pa.

**B-13 BELT FLUID**—Leaflet, 2 pages—Describes a new liquid belt dressing designed to prevent belt slipping and increase pulling power. Gives results of plant test before and after treating belt with fluid.—CHESTERTON MECHANICAL PACKINGS, Everett 49, Mass.

**B-14 ROTARY MAGNETS**—Leaflet, 6 pages. Describes features of new Eriez rotary magnets for floors, tanks, driveways, and general use. Illustrates rotary sweepers and tank magnets. Gives list of industrial applications. Includes prices and specifications.—ERIEZ MANUFACTURING CO., Erie, Pa.

**B-15 PROTECTIVE COATINGS**—Price List No. 1250, 4 pages—Describes types of bitumastic protective coatings formulated specifically to prevent corrosion and deterioration. Lists applications for each type and gives prices per gallon in various locations.—KOPPERS COMPANY, INC., Tar Products Division, Pittsburgh 19, Pa.

**B-16 CORROSION PREVENTION**—Leaflet, 4 pages. "Bitumastic No. 50"—Describes product known as "Bitumastic No. 50" designed for protecting metal and concrete surfaces against severe corrosive conditions. Illustrated with photographs of actual plant applications. Characteristics are described in detail.—KOPPERS COMPANY, INC., Tar Products Division, Pittsburgh 19, Pa.

**B-17 FLOOR TREATMENT**—Bulletin, 4 pages—Describes "Flintdek", a floor coating to prevent hazards of slipping on wet or dry floors. Composition and uses are given, and applications are illustrated with line drawings. Other Flintkote products for maintenance and construction are listed.—THE FLINTKOTE COMPANY, Industrial Products Division, 30 Rockefeller Plaza, New York 20, N. Y.

**B-18 FLOOR SWEEPER**—Bulletin 4 pages—Covers industrial floor sweepers, including design, features, operation, specifications for models available, and partial list of users. Illustrated with photographs.—HANDLING DEVICES CO., INC., 581 Boylston St., Boston 16, Mass.

**B-19 INDUSTRIAL MAINTENANCE**—Bulletin, 4 pages—Basic tools for industrial maintenance are described and illustrated. Action photographs show Kent scrubbers and suction equipment in use in plants.—THE KENT COMPANY, INC., Rome, N. Y.

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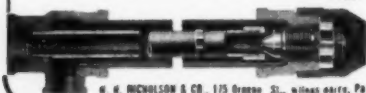
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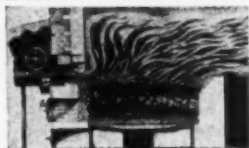
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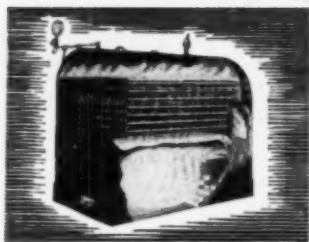
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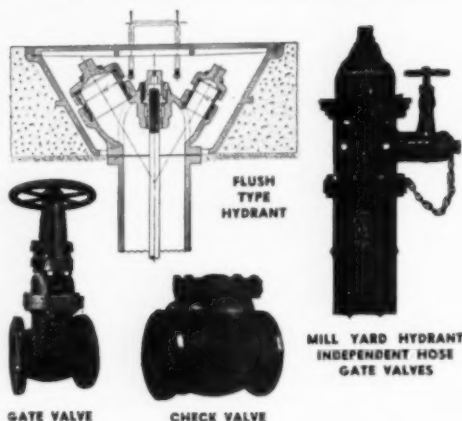
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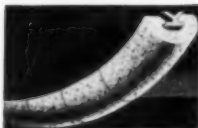
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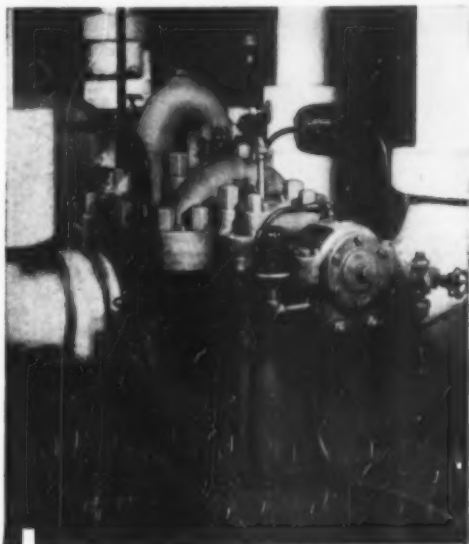
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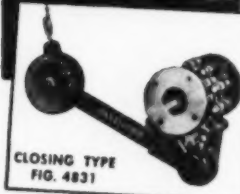
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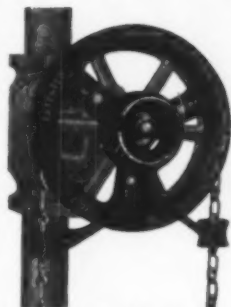
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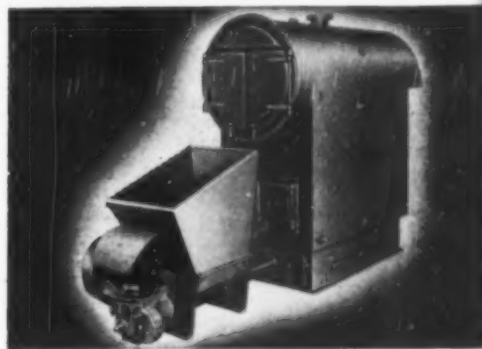
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Fig. 3061 W. E.—Class 300-pound Cast Steel Swing Check Valve with welding ends and bolted cap. Disc has ample lift to permit full straightway, unobstructed flow through the valve body.



Fig. 11313 W. E.—Class 1500-pound Cast Steel Pressure Seal Gate Valve. Has venturied ports, welding ends and special by-pass. Bevel gear operated.

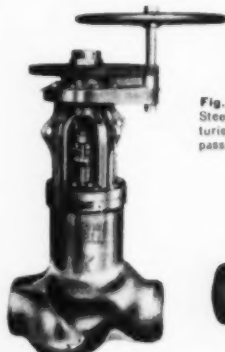


Fig. 19084 W. E.—Class 900-pound Cast Steel Pressure Seal Globe Non-Return Valve with welding ends and spur gear operation. Its improved streamline design reduces pressure drop and turbulence to the minimum.



Fig. 11323 W. E.—Class 1500-pound Cast Steel Pressure Seal Gate Valve with welding ends. Has top-mounted electric motor operator for quick positive opening and closing.



Fig. 1333-A.—Class 1500-pound Steel Integral Bonnet Angle Valve with welding ends. Also available in Globe and "Y" patterns.



Fig. 1793.—Large 125-pound Iron Body Bronze Mounted Gate Valve with flanged ends, bolted flanged yoke, outside screw rising stem and tapered solid wedge.



Fig. 150.—150-pound Bronze Globe Valve. Screwed ends, union bonnet and renewable composition disc.

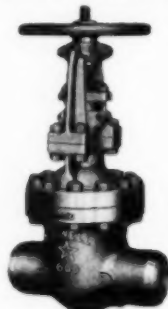


Fig. 6003 W. E.—Class 600-pound Cast Steel Gate Valve with welding ends, outside screw rising stem, bolted flanged yoke and tapered solid wedge.

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